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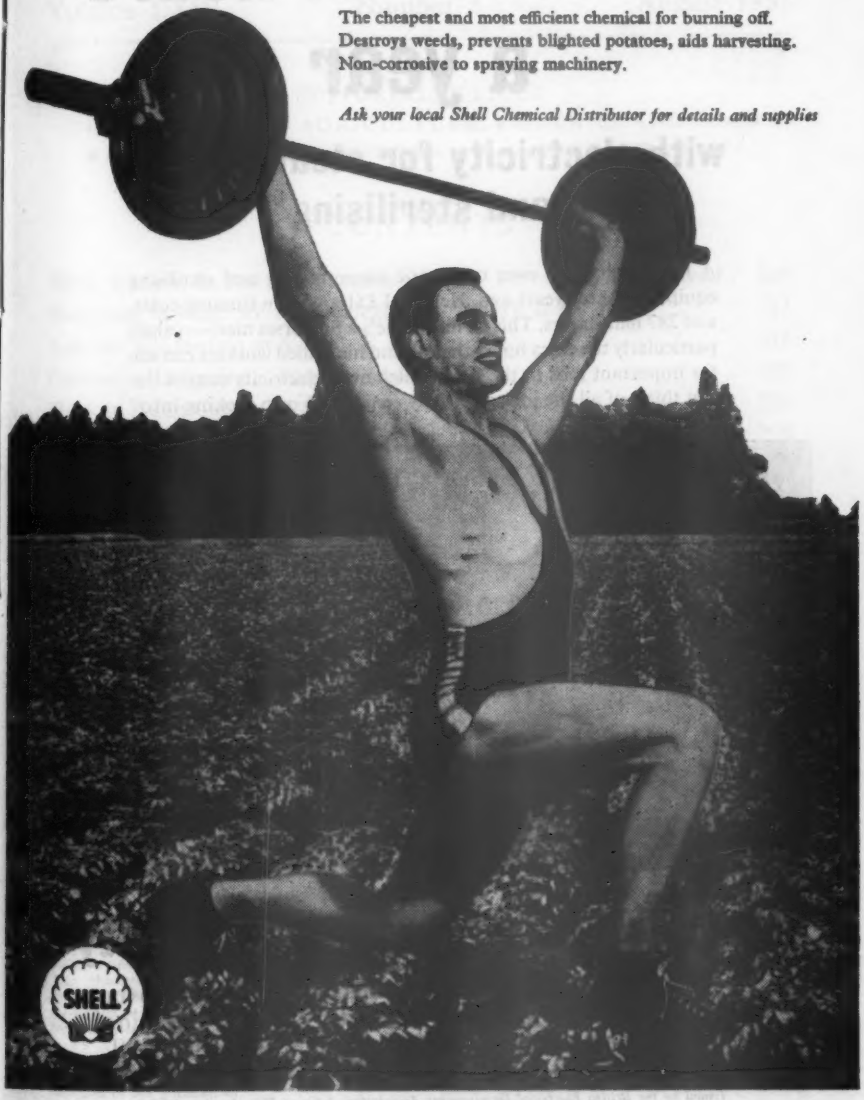

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Volume LXIV Number 5 August 1957

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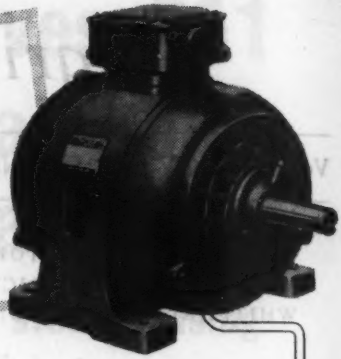

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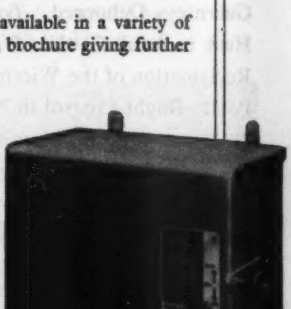

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Work Study as an Aid to Management

E. S. CARTER,* B.SC.(AGRIC.) and SUSAN READ, B.SC.(AGRIC.), M.S.(MINN.)
National Agricultural Advisory Service, South Western Region

Work study applied by N.A.A.S. officers to farm organization with a view to raising the general level of output on a Gloucestershire farm clearly shows the value of a fresh approach to old problems of management.

WORK study is already used extensively by management in industry as a means of increasing labour efficiency. Its application to agriculture has not been widely pursued in this country so far, but it is progressing steadily.

The British Productivity Council has sponsored a series of practical exercises on the application of work study to farming, and a report on some of these has been issued[1]. University Departments of Agricultural Economics are also interested in this work and some private organizations are carrying out investigations into the best ways of performing certain farm jobs—especially milking—with a view to drawing up ideal plans for milking parlours[2].

Work study is considered as a "tool of management" in industry and it can be equally useful on the management side of farming[3]. The National Agricultural Advisory Service, with the co-operation of the University Departments of Agricultural Economics, has developed a system of giving advice on farm management, and there is no doubt that great strides have been made in this aspect of advisory work in recent years. Farm management in this context deals with the appraisal of the farm as a business concern, the diagnosis of weaknesses in organization and advice on reorganization, in order to achieve the best possible integration of business methods with sound farming.

The District Advisory Officer also uses the technique of partial budgeting to advise on the possible introduction of new enterprises, or the substitution of new enterprises for existing ones. In the preparation of the farm plan, the District Advisory Officer has to take into account the amount of labour available to carry out the work entailed. He has always made some instinctive appraisal of the deployment of labour on the farm, and, in the actual formulation of the plan, must take great care that no peak demands for labour will occur which cannot be met by the existing forces.

It is here that the development of work study, which involves the examination of the basic work routine of any job, can help to put the deliberations of the farmer and the District Advisory Officer on a sound footing when they are drawing up a farm plan. Work study is of inestimable value as a further advisory technique which may be used to ensure that the farmer obtains the greatest benefit from any changes he may make in his farm organization. A new plan may well mean intensification of a farming system and call for

---

* Mr. Carter is now serving in the N.A.A.S., East Midland Region.

greater flexibility of labour, but work study applied to routine farm jobs often reveals unexpected ways in which the existing force can cope with extra productive work.

A case in point

The new advisory technique can be illustrated by reference to a case study on a mixed farm of 250 acres in Gloucestershire where the return obtained was felt to be too low. At the farmer's request a visit was first made in the summer of 1956. An analysis of the farm accounts for the previous year revealed that output per acre was lower than for standard farms and that, although yields from both crops and stock were good, the farming system was too extensive to yield a reasonable return. Three men were employed and the gross output per £100 of total labour was £349, whereas the local standard was £421. The labour index[4] was 76 per cent, indicating that the farm's labour force was not being employed fully and that there was ample scope for the introduction of new enterprises.

To increase output, the farmer was advised to intensify the farm business by the following measures:

1. *to increase the cash crop acreage by growing more corn for sale.* In drawing up the farm plan, consideration had to be given to the layout of the farm and the suitability of fields for arable cropping and their use by the dairy herd. A Rotation "A" was drawn up incorporating fields, mainly on the perimeter of the farm, which would take three corn crops and a four-year ley. (In many cases it would be necessary to examine the farm buildings to ensure that there was adequate storage space, and work study principles would be applied, with the co-operation of the appropriate specialist Officer for construction work, but in this particular instance proper facilities were already available.)
2. *to increase milk production on the farm.* The dairy herd consisted of twenty-six attested Friesians, and an increase to thirty-six was recommended. A second rotation, Rotation "B", was devised to use land near the buildings for early bite, kale and silage. This would mean less walking for the dairy herd, simplification of silage-making operations and a reduction in milk production costs.
3. *to introduce extra enterprises*—a pig unit and deep litter poultry unit. The landlord had previously agreed to modernize the pigsties, and there was space available in the farm buildings for a deep-litter unit.
4. *to maintain the existing flock of eighty ewes*, with improved grassland management and utilization.

It became clear that while the existing labour force would be able to cope with the increased arable work, dealing with more cows, pigs or poultry would throw a considerable strain on the labour organization, especially on teams at haymaking and harvest. Employing additional labour would throw the whole plan out of balance, and therefore some relief in routine work had to be sought. It became apparent that the man-hours demanded by the system of milking were excessive, and that the work routine should be analysed. When this analysis was carried out the herd had already been increased to thirty cows, milked twice a day, in a conventional, double-range cowshed with eighteen standings. The animals were collected in a yard and the first

eighteen allowed into the shed; after the nine cows on one side of the shed had been milked, they were turned out and the remainder let in until milking was completed. The entire herd was then turned out into a covered yard near the cowshed for feeding overnight.

Two men were employed in milking; usually the farmer himself operated the four-bucket units, with an assistant who carried the milk to the dairy for cooling, brought in cake and shifted the cows in two batches.

It was seen that some economy in labour could be made and the analysis of the time study soon indicated where the faults lay:

Time spent on p.m. milking operation	*3 man-hours (see Fig. 1)*
Average milking-out time	9 minutes per cow
Milking rate	1·7 lb per minute per unit
Throughput	6·25 cows per hour per unit
	14·3 cows per man-hour

The conclusion to be drawn from these figures was that the cows had become accustomed to slow milking, partly because with four units the operator was unable to avoid some over-milking; the following suggestions for revising the cowshed routine were therefore made:

1. the number of units to be reduced to three;
2. a feed barrow, in-churn cooler and larger capacity strainer to be obtained;
3. milking technique to be improved by use of a warm udder wash;
4. to ensure milking in two batches instead of three, the method of turning cows out to be altered.

The aim was to enable one man to do all the preparation and milking, with help, if available, for the clearing up. The plan was put into practice eventually and is now operating, with the following results:

Time spent on p.m. milking operation	*2 man-hours (see Fig. 2)*
Average milking-out time	7·5 minutes per cow
Milking rate	2 lb per minute per unit
Throughput	7·6 cows per hour per unit
	22·8 cows per man-hour

Milking routine
Time spent before and after adoption of new routine

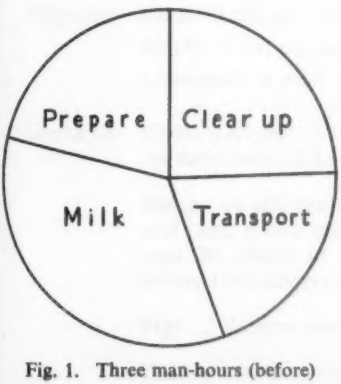

Fig. 1. Three man-hours (before)

Fig. 2. Two man-hours (after)

One man now finds the milking operation well within his capabilities. The cows have become much quicker already, but it should be possible to speed up milking still further. As the operator becomes accustomed to the new routine, he finds that he can devise new ways of saving himself steps and, in fact, the times recorded four weeks after the new method was adopted are continually being improved upon. The new routine has already brought about a saving of 2½ man-hours per day, or fifteen working weeks per year, as well as a considerable sum in overtime. In addition, the farm workers who alternate in doing the weekend milking now get more free time, and the assistant who used to help with the morning milking at 6.30 does not come to work until 7.30. The labour saved is used for pig feeding, and so, indirectly, will make an important contribution to the farm income. There will be less dislocation of teams at harvest and haymaking, and on other outside work now that only one man is responsible for milking.

This is an example of the application of work study in making better use of labour at little cost to the farmer. In this case, no alterations to buildings were involved, and in fact all that has happened has been a reorganization of milking routine, the use of a barrow for feeding and the employment of an in-churn cooler at a total cost of £20—a remarkably worthwhile result for so small an outlay. There has been no reduction of the labour force on the farm as a whole, and indeed redundancy is hardly ever likely to occur as a result of work study in agriculture because the overall labour requirements on a farm are relatively inflexible.

References

1. *Work Study Aids Farmers.* British Productivity Council, 8 pages.
2. Work Study Applied to the Milking Parlour. K. J. CHETWYND. *Agric. Rev.* 1, No. 12, 35–9.
3. A Better Method—Less Waste. I. G. REID. *Agric. Rev.* 1, No. 5, 31–6.
4. *The Farm as a Business.* H.M. Stationery Office, 1957. 39–40.

Budgeting in Beef

G. K. Loveless, B.A., and W. E. G. Bolt, N.D.A.
National Agricultural Advisory Service, South Western Region

A limited farming system imposed by difficult natural conditions need not limit the scope for trying out new ways of increasing income. Here is a case in point.

THERE are many farms up and down the country where, because of unkind soil and climate, absence of a satisfactory water supply, inadequate buildings, remoteness from a main road, lack of suitable labour—or sometimes even from choice—milk production does not form part of the farming system. Where such conditions exist, and cattle rearing forms the main enterprise, the net farm income is often disappointingly low. In an endeavour to help farmers faced with this kind of problem, the authors devised some partial budgets which were demonstrated to selected audiences at "Farmhouse Meetings" in Cornwall last winter.

The essence of partial budgeting is to compare the relative profitability of different systems. But to avoid discussing principles and generalities, a typical farm has been chosen where cattle raising is the main enterprise.

This farm extends over 102 acres of medium loam at 350–1,000 feet above sea level; rainfall is 45–60 inches a year. The work is performed by the farmer himself and one hired man. The present pattern of farming, which may be truly described as "mixed but without milk", is summarized below. The standard of husbandry or efficiency in labour utilization is outside the present consideration.

Cropping 10 acres corn: 5 acres roots and green crop:
30 acres temporary grass: 57 acres permanent grass.

Manuring Corn: 3 cwt per acre superphosphate.
Roots: 8 cwt per acre compound.
Grassland: a total of 10 ton basic slag.

Livestock Cattle (Devons): 12 cows and their calves. Calves are suckled on their dams and are sold fat at about three years.

Sheep: A self-contained flock of 31 Devon Longwool ewes and ram: 6 ewe hoggs as replacements. The lamb crop averages 36; about 15 are sold early and the remainder shorn before their futures are decided.

Pigs: 2 Wessex sows produce weaners for sale.

Poultry: 70 hens in deep litter.

With this level of production, a high income would not be expected, and this is certainly borne out by the profit and loss account:

Costs	£	Sales	£	£
Rent and rates	127	10 fat 3-year-old cattle	700	
Wages	350	2 fat cows	100	
Feed	285	Subsidy on 12 calves	96	
Seeds	43			896
Manures (including lime)	110	30 lambs	210	
Power and transport	250	5 old ewes	20	
Contract and haulage	80	Wool	126	
Sundries	150			356
	1,395	33 weaners		165
		Poultry and eggs		250
Net Farm Income	307	Ploughing grant		35
	1,702			1,702

It will be noted that the farmer's own income is less than that paid to his worker, and this state of affairs, though apparently unbelievable to many farmers, is none the less true and all too common.

In our initial budgeting exercise, we were concerned with only the cattle enterprise, but it is appreciated that the alternative measures we suggested do not constitute all the possibilities for dealing with this one enterprise. The budgets are based on the assumption that any given number of animal units, whatever form they may take, require the same quantity of total nutrients. Therefore, provided the total animal units remain constant, there will be little or no change necessary in the cropping programme of the farm. The price of beef was estimated at £6 11*s.* per cwt, which was the average operating when the budgets were first prepared.

Present beef system

The existing enterprise consists of 12 beef cows, each rearing its own calf, 10 of which are ultimately sold fat nearer three years old than two, while a couple of the heifers enter the herd as replacements. Thus there are three generations of followers on the farm—a total of 48 cattle:

	Animal units
12 cows	15
12 2–3 years old cattle	12
12 1–2 years old cattle	9
12 0–1 year old cattle	6
48	42

and the analysis of the cattle output:

	£
10 fat cattle at 3 years @ £70	700
2 fat cows @ £50	100
Calf subsidy on 12 calves reared @ £8	96
	896

This is the only part of the farming system with which we are concerned.

First alternative: beef only—multiple suckling

Our first alternative involves intensifying the present system—4 of the best cows are selected for their milking capacity and are used for multiple suckling, with the aim of rearing a total of 16 calves a year, one heifer being retained as a replacement. It will be seen that the animal units approximate to the original number:

	Animal units
4 cows	6*
16 2–3 years old cattle	16
16 1–2 years old cattle	12
16 0–1 year old cattle	8
52	42

*Animal units increased to 1½ per cow because of higher milk yield

This system provides 15 mature fat cattle and one fat cull cow for sale each year, but it does involve the purchase of 12 additional calves. The partial budget of this system is as follows:

EXTRA COSTS	£	£	EXTRA OUTPUT	£
12 calves @ £15		180	15 fat cattle @ £70	1,050
OUTPUT SACRIFICED			1 fat cow @ £50	50
10 fat cattle at 3 years @ £70	700		Subsidy on 16 calves @ £8	128
2 fat cows @ £50	100		COSTS SAVED	
Subsidy on 12 calves reared @ £8	96		nil	
		896		
EXTRA INCOME		152		
		1,228		1,228

The demands on capital are less than those in the original cattle enterprise.

Second alternative: cow-heifer system

The second alternative is the elimination of the beef cows by the adoption of a cow-heifer system. This entails maintaining a throughput of fat heifers after each has reared one calf. To keep in line with the original number of animal units, 19 heifers are calved down at about two years old, from January to March each year. The bull calves are immediately replaced by heifer calves and extra ones purchased to cover losses at calving. With this suggested number of stock, the animal units are only slightly in excess of the original.

	Animal units
19 2–3 years old heifers	19
19 1–2 years old heifers	14·25
19 0–1 year old heifers	9·5
57	42·75

The financial benefit of this alternative is shown in this partial budget:

Extra Costs	£	£ s.	Extra Output	£ s.
3 calves (heifers) @ £15		45	19 cow heifers @ £64	1,216
Output Sacrificed			Subsidy on 19 calves @ £7 10s.	142 10
10 fat cattle at 3 years @ £70	700		Costs Saved	
2 fat cows @ £50	100		nil	
Subsidy on 12 calves reared @ £8	96			
		896		
Extra Income		417 10		
		1,358 10		1,358 10

The capital demanded for this system is even less than that for the first alternative.

(The authors appreciate that since the last February Price Review, the guarantee has been removed for cow-heifer beef, but as these animals will be less than three years old, it is fair to assume, judging by recent demands, that the prices allowed in the budget are realistic.)

Third alternative: weaner calves

Our third proposition concerns the production of weaner calves. This system requires the maintenance of as large a herd of beef cows as possible (limited of course to the original number of animal units), each suckling one calf per year. The aim would be to calve the cows from January to March and sell the weaners in October before they make any demands on winter feed. Calves born in the late winter will be strong enough to utilize fully the spring flush of milk from the dam during late April and May. Sufficient heifers are retained to maintain the herd, but under this system the breeding life of the cow is a little longer.

Animal units are thus:

	Animal units
28 cows	35
5 2–3 years old cattle	5
5 1–2 years old cattle	3·5
38	43·5

and the partial budget:

Extra Costs	£	Extra Output	£
nil		20 weaners @ £30	600
		5 fat cows @ £50	250
Output Sacrificed	896	Subsidy on 20 calves @ £8	160
Extra Income	114		
	1,010		1,010

Note: it is estimated that 3 cows will fail to breed and some of the calves will be sold before becoming eligible for subsidy

This alternative demands a high capital investment in parent stock. Therefore to exploit the system fully, particularly on the farm where home-grown corn is available, the logical extension is to take the weaners on to baby beef at 12–15 months old.

Fourth alternative: baby beef

The production of baby beef affords yet another solution. For simplification, the authors have charged the extra feed necessary to finish the weaners as suggested above, though they realize that a completely different alternative could be presented by readjusting the stock numbers. The partial budget details are:

Extra Costs	£	£	Extra Output	£
13½ tons hay @ £12	162		20 baby beef cattle @ £58 10s.	1,170
8 tons concentrates @ £30	240		5 fat cows @ £50	250
		402	Subsidy on 25 calves @ £8	200
Output Sacrificed		896	Costs Saved	
Extra Income		322	nil	
		1,620		1,620

The suggested ration per head, per day, consists of 10 lb hay and 6 lb home-grown concentrates (six parts cereal to one part groundnut meal). Hay is costed at £12, cereals at £25 and groundnut meal at £50 a ton.

Fifth alternative: selling dairy heifers

Despite the increase in milk production, there are still many holdings tied to milk in need of dairy replacements. Our fifth alternative caters for this demand. Moreover, many farmers bound to beef cattle could still produce dairy replacements without breaking away completely from their native breeds. The system involves multiple suckling as outlined in the first alternative using beef cows, but initially dairy-type heifer calves are bought instead of beef calves—that is, 12 in each of the first two years of the changeover. By the third year, the dairy heifers will be calving down and are sold off the calf, all bull calves being sold and replaced by heifers. To allow for barren heifers and calving losses, additional heifer calves are allowed for in the partial budget. One replacement for the rearing herd is retained each year.

The partial budget is:

Extra Costs	£	£	Extra Output	£
7 dairy heifer calves @ £20		140	3 fat beef cattle @ £70	210
Output Sacrificed			1 fat beef cow @ £50	50
10 fat cattle at 3 years @ £70	700		5 bull calves @ £4	20
2 fat cows @ £50	100		2 barren heifers @ £64	128
Subsidy on 12 calves reared @ £8	96		10 newly-calved heifers (off calf) @ £80	800
		896	Subsidy on 4 beef calves @ £8	32
Extra Income		204	Costs Saved	
			nil	
		1,240		1,240

Conclusion

In all these suggested systems, it has been assumed that the standard of husbandry will remain at the level originally attained on this specimen farm, which is extensive and rather easy going. Much heavier stocking would be

possible, but a higher standard of both husbandry and management would be required. For example, with cows of heavier milking capacity, fewer nurse calves would be necessary to rear a given number of calves under the multiple-suckling systems. The baby beef system could be intensified by buying replacement suckling cows instead of rearing them, and so permitting a larger number of productive units to be carried with an increased turnover. This system, which is really a direct conversion of milk to beef, permits the use of all the modern techniques applicable to the small dairy farm to the rearer, without the disadvantage of hand feeding four different age groups of stock during the winter.

In the course of discussions with farmers at farmhouse meetings, innumerable alternatives were put forward by the audiences themselves. Only lack of space prevents our quoting them!

Limited Self-feeding of Silage

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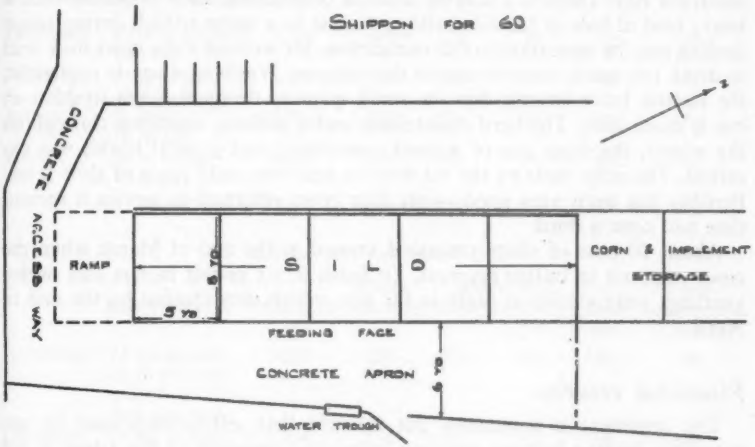
National Agricultural Advisory Service, West Midland Region

One of the advantages of the restricted method of self-feeding silage is that it can usually be adopted without involving much, if any, capital expenditure. Farmers who are thinking of building a new silo will be particularly interested in the way in which Mr. G. E. Done, a Cheshire farmer, has used his Dutch barn and the shippon adjacent to it.

IT is now becoming accepted that the principle of self-feeding silage properly applied with a suitable building layout can be an efficient and labour-saving means of using this product. The chief obstacle to wider adoption of the method has been the belief that it is suitable only if unrestricted access to the silage is allowed. From this it followed that only cattle outwintered, or housed in yards, could self-feed on a practical basis, and also that the minimum quantity required would be governed by the animals' appetite: in the case of the Friesian with twenty-four hour access, this could be as much as a hundredweight a day, or 7½ tons in five months. Farmers who, for one reason or another, are tied to the shippon system of management, or who cannot make provision for the necessary quantity of silage, have been discouraged from trying self-feeding.

The experience of Mr. G. E. Done of Cattenhall Farm, Frodsham, has shown that dairy cows housed in shippons can self-feed silage in a limited time with very satisfactory results. The milking herd numbers sixty dehorned, commercial, attested Ayrshires with a bulk average of 800 gallons per cow. The winter feeding plan consists of kale, strip-grazed until New Year, followed by silage for three months until the cows are turned out on to Italian ryegrass in late March or early April. A light feed of 6 lb of hay is given throughout.

About 220 tons of silage are made from leys by buckrakes to an average depth of five feet in a surface silo, which occupies five bays of a seven-bay Dutch barn adjacent to the shippon. One side is of pre-cast concrete slabs 6 feet × 1 foot × 4 inches. On the other side, the silage has been contained by corrugated iron sheets held by two horizontal sets of timbers running between the stanchions of the barn. For self-feeding, the lower timbers and the sheets were removed. The steel sheets were not entirely satisfactory as a containing wall, so that this year sleepers have been substituted. When removed from the feeding face they will be erected as a temporary windbreak behind the apron. The floor of the silo has been concreted, together with an apron six yards wide.



Method of feeding

The cows are allowed access to the silage once a day, in three groups. The first group of twenty-seven cows goes out from 7 a.m. to 9 a.m., and a second similar group from 9 a.m. to 11 a.m. The third group, consisting of six nervous cows which normally hang back if turned out with the others, goes out from 11 a.m. to 1 p.m. An electric fence is used to regulate the consumption, the height of the wire being adjusted according to the angle of the feeding face at the time. The cows prefer the lower layers, so when the feeding face is vertical, the wire is set low to encourage feeding of the top layers, thus preventing "burrowing". A tension spring is incorporated at each end of the wire to keep it taut. The electric fence will also be used in future to separate a bay for the nervous cows, so that it will be possible to turn them out at the same time as the others. At one point, the silage reaches a depth of six feet, which has proved too much and necessitated occasional cutting to a depth of a foot or so to loosen the silage and enable the cattle to make further progress. Next year the silo will be extended to a further bay and will not exceed a depth of five feet.

The feeding face allowed is about one yard per cow. This could not be reduced much, for although the cows feed avidly for the first few minutes, there is considerable jockeying and changing of position subsequently. With adequate room behind them, the exercise thus obtained is considered beneficial. The cows become accustomed to the period allowed; as the time approaches for their return to the shippon, a number leave the feeding face and loaf about on the apron and approach-way, having eaten their fill. Although they are bedded on sawdust and receive no straw, they remain contented until the afternoon milking, when corn is fed. A night feed of 6 lb hay is given to complete the twenty-four hour ration.

Consumption of silage (calculated on cubic capacity eaten) is 70–75 lb per head, per day. There is a notable absence of grunting, such as occurs after a heavy feed of kale or hand-fed silage. Access to a water-trough during silage feeding may be important in this connection, for without it the cows may tend to drink too much on returning to the shippon. Waste of silage is negligible; the electric fence ensures that the small quantity dropped is not trodden on but is eaten later. The herd maintained useful milking condition throughout the winter, the dung was of normal consistency and general health was excellent. The only visits by the vet were to treat two mild cases of slow fever. Fertility has been very good—only four cows returned to service a second time and none a third.

About 30 tons of silage remained unused at the end of March when the cows went out to Italian ryegrass. To finish it, six in-calf heifers and twelve yearlings were yarded at night in the silo, which they cleared by the end of April.

Financial returns

The argument is sometimes put forward that self-feeding must be uneconomic feeding because accurate individual rationing of the silage is not possible. This is not borne out in Mr. Done's experience. The comparative figures shown in the tables for production and feed costs during the past two winters illustrate this point. They also indicate how a substantial saving in the use of concentrates can be achieved without a substantial fall in production. When considering these figures, it should be remembered that, in 1956/7, only twelve cows had calved after Christmas, and that in February the average stage of lactation was 6½ months.

The aim throughout has been to provide maintenance and the first gallon from bulk foods, 2 lb of oats providing for the next half gallon. A mixture of oats and protein meal is fed at the rate of 4 lb per gallon for all additional milk. Total use of concentrates (purchased and home-grown) for milk production during the winter of 1955–56 amounted to 5·70 lb per gallon. The concentrate ration consisted of equal parts by weight of oats and grain balance. For the winter of 1956–57, the figure was 3·48 lb per gallon. This time the concentrate ration was not a uniform mixture throughout, but consisted of oats and soya flakes in varying proportions, the ratio of oats increasing towards the end of the winter.

For the actual period when silage was fed, the figures were: January–March 1956, 6·0 lb per gallon; January–March 1957, 3·5 lb per gallon. During the latter period the daily margin between receipts and total feed cost

varied from £9 13*s.* to £10 7*s.* (bought and home-grown feeds at valuation).

This method of overcoming the labour of silage feeding has attracted considerable attention in the neighbourhood and has been favourably commented upon by many farmers who have seen it working. Several of them are planning to adopt the system next year—a result which speaks for itself.

Silage fed in shippon—1955–56

	Bulk ration	Milk sold	Gross receipts	Bought feed Cost	Bought feed Quantity	Oats	Total concentrates
		gal	£	£	*cwt*	*cwt*	*cwt*
November	Kale to appetite 6 lb hay	3,930	755	148	78	78	156
December	Kale to appetite 6 lb hay	3,226	645	176	93	93	186
January	56 lb silage 10 lb hay	3,056	613	176	93	93	186
February	56 lb silage 10 lb hay	2,976	562	176	93	93	186
March	56 lb silage 10 lb hay	3,950	647	152	80	80	160
	TOTAL	17,138	3,222	828	437	437	874

Silage self-fed—1956–57

	Bulk ration	Milk sold	Gross receipts	Bought feed Cost	Bought feed Quantity	Oats	Total concentrates
		gal	£	£	*cwt*	*cwt*	*cwt*
November	75–80 lb kale 20 lb wet beet pulp to 19 Nov., then 6 lb hay	3,406	651	76	38	56	94
December	75–80 lb kale 6 lb hay	3,058	520	86	43	66	109
January	70–75 lb silage* 6 lb hay	3,424	583	86	43	46	89
February	70–75 lb silage* 6 lb hay	3,398	562	83	42	81	123
March	70–75 lb silage* 6 lb hay	4,574	690	83	42	117	159
	TOTAL	17,860	3,006	414	208	366	574

*Silage analysis: 23 per cent dry matter, 15·2 per cent crude protein in dry matter

Guernseys Dehorned

TOM BILLINGTON

To dehorn or not to dehorn, that is the question.

DEHORNING is becoming increasingly popular in all breeds of cattle. Exact figures are not available, but last winter the Milk Marketing Board asked recorders to collect information on the number of cows dehorned in the N.M.R. herds visited. The results show that nearly 40 per cent of all cows in N.M.R. herds are dehorned. Dividing the figures into breeds, Guernseys provided the second largest percentage of dehorned animals—38·4 per cent.

Some farmers who would like to see their herd without horns hesitate to take the plunge for various reasons. Some are reluctant through dread of the actual operation and possible suffering to the cows. Others fear the possible effect on milk yields or the loss of sales.

The English Guernsey Cattle Society recently asked a number of Guernsey breeders who had dehorned their herds—some over ten years ago and others within the last year—to record their experiences.

It is stressed that the operation must not be done when there are flies about, and must therefore take place before the hot weather sets in, and preferably when there are no cold winds. The most favoured times are late spring or early autumn. With smaller herds of about twenty animals, the operation was finished in one morning; larger herds were completed within two days.

The horns were removed by a veterinary surgeon with a wire, saw or dehorning shears, after the cow had been given an anaesthetic. Ten years ago a general anaesthetic was used, and this was then the only legal method. Today the method is to inject a local anaesthetic at the base of the horn and to tie a string tightly round the crown of the head.

Two correspondents described the operation as "an unpleasant business", but most agreed that it was carried out far more quickly and easily than they had anticipated. One woman breeder, dreading the process but determined to be present to ensure that her cows did not suffer, was "amazed at the speed and ease with which the whole operation was performed".

The horn stubs are dusted with antiseptic powder until they heal. Only in a few cases did the horn discharge continue for more than a week. In a few cases where the cavity became septic, the trouble was soon cleared up by treatment, such as removing the scab, draining, and washing with weak antiseptic. Bleeding during the first day could usually be stopped by tightening the string round the head.

Most breeders reported that the cows seemed quite unaffected, including some which were close to calving, and were grazing immediately after the operation. It is suggested that they should be let out to graze at once, and not allowed to pull hay out of racks above their heads, because of the risk of infection from dust.

Some breeders reported a slight drop in milk yield for a few days, but in

all cases it was back to normal within three days. In other herds the yield was not affected, and at least two farmers said that yields subsequently rose above what it had been before dehorning. This was particularly noticeable in the case of nervous cows, which had probably been bullied out of their fair share of the food and could now eat in peace.

A quieter life

Many farmers were persuaded into dehorning by such incidents as damaged flanks or torn udders, which sometimes led to the loss of a valuable cow. Others because of the difficulties and space required to yard horned cattle. They have found that they can get many more into a yard; for instance, thirty where only twenty were kept before. Although there is still an occasional bruised udder, they are never torn and there is no damage to flanks, so that the value of the hide is increased.

The animals are quieter and keep in better condition with less food, because there is no chivvying and bullying by the more vicious animals. They sleep more quietly in yards, since, when one gets up, the others need not do so to avoid getting a prod. The cows pack better against an electric fence, and are less inclined to knock it down, and there is no barging at doors and gateways.

Another aspect is the greater uniformity in the appearance of a herd, which may be spoilt by an occasional high yielder with ugly horns. There are breeders who believe that beauty should not be entirely sacrificed to utility, and who get much pleasure from the appearance of their stock. But is the dairy cow's beauty decreased by the loss of her horns? One Guernsey breeder, reluctant to see the loss of the fine, curved amber horns, found compensation in seeing for the first time good and bad characteristics which had been overlooked when "dazzled by the horn". Another, who dehorned in 1946, says that Guernseys with "handlebars" now seem strange and untidy to his eyes. True, a new cowman may find it more difficult to recognize individual cows, but this is a very slight disadvantage.

A word of warning came from a breeder who decided from painful experience that it was a mistake to dehorn the bulls—they are more difficult to tether.

What of the effect on sales? One breeder who began to dehorn all calves about seven years ago said sales suffered as a result, so he now dehorns only those which he wants to keep. Some people found no noticeable effect on sales, some that business had been lost but more gained, and one that buyers come to his herd *because* there are no horns.

Dehorned prize-winners

One gets the impression that, until recent years, dehorned Guernseys may have been more difficult to sell, whereas today, with more herds dehorned, there is no lack of buyers. At several shows last year, including the London Dairy Show, special prizes were offered for dehorned cattle. No less than seven dehorned Guernseys appeared at the 1956 Dairy Show, and from their ranks came the champion and winning team of the breed, as well as other prize-winners. Another dehorned Guernsey won both the championship and

"exhibitor-bred" cup at the breed society's event last autumn; and the reserve for the latter cup was also dehorned.

It is understandable that when few herds were dehorned it would be difficult or unwise to introduce a few hornless cows into a herd. The same thing applies in reverse: the increasing number of dehorned herds must increase the demand from buyers.

The calves can easily be dehorned, as soon as the horn bud can be felt, with collodion (usually preferred to a caustic pencil) or an electric iron. Most people are deterred by the operation of dehorning the adult animals, but the experience of those who have done it suggests that it is much easier than anticipated.

The operation, once accomplished, cannot be undone, and perhaps some allowance should be made for a tendency to make the best of an established situation. But none of the informants said they regretted the change, and the majority wished they had done it years earlier. "Dehorning has simplified the herdsman's job enormously," said one. "We have never regretted the decision, and have found many benefits from it," said another. A third, asking "What is the use of horns on dairy cattle?" looks forward to the time when naturally polled strains of Guernseys will be bred.

Husk in Adult Cattle

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The control of husk must be based on acquired resistance to the parasite. Present research work aims at devising methods of grazing management which will ensure that this resistance is established and maintained.

UNTIL relatively recently, husk in adult cattle was rarely recognized. In the past six years, however, considerable progress has been made towards an understanding of the disease. In a typical outbreak among adults, symptoms appear quite suddenly and almost simultaneously in an entire group of cattle. Sometimes within hours of the first sign of disease, one or two deaths may have occurred and a large proportion of the herd may be suffering from acute respiratory distress. Coughing, which is often regarded as the most prominent symptom of husk in the calf, does not attract attention. Meanwhile larval worms in the dung, upon which the confirmation of a diagnosis of husk normally depends, may be absent and adult worms are often not to be found in the lungs of animals that die. Yet another puzzling feature is that most outbreaks among adults occur on farms where clinical husk has not been seen for many years.

It is well known that with increasing age cattle become resistant to lungworm infection. The appearance of disease in mature cattle therefore raises the question whether this resistance has been absent or its efficiency in some

way impaired. Experiments have shown that resistance to lungworms is dependent on exposure to infection. Adult cattle which have been reared away from all contact with the parasite are as susceptible as young calves. Field investigations, however, indicate that husk in adults is hardly ever the consequence of introducing infection into a lungworm-free herd. Such herds are, in fact, extremely rare and it may be assumed that lungworms are present on nearly every farm where cattle are kept. The infection can apparently persist in a herd almost indefinitely on a modest scale, the numbers of worms failing to become sufficiently great to give rise to symptoms of disease. It is in herds where this has been the situation that outbreaks among adults are found. On farms where husk occurs in the calves every year, older cattle are not affected.

Acquired resistance

The resistant animal responds to infection in three ways. These result respectively in preventing larval worms newly picked up from the pasture from becoming established, apparently by hindering their migration from the intestine to the lungs; secondly, in the inhibition of the growth and development of the worms in the lungs, and lastly, in the elimination of worms from the lungs. When an animal is infected for the first time the worms migrate to its lungs and grow to maturity, the whole process taking some twenty-one days. The female worms lay eggs which hatch almost immediately and the larvae pass up to the mouth, are swallowed and so appear in the dung. After a period which may vary from three weeks to three months, the infection is terminated spontaneously by the elimination of the adult worms from the lungs. If a resistant animal is infected, only a proportion of the worms succeed in reaching the lungs. Of these, the majority are apparently quickly eliminated, and a small residue persists but fails to develop at the normal rate.

The ability of the animal to prevent the establishment of worms is acquired gradually, and its effectiveness depends on the rate at which the animal has been picking up worm larvae. In the absence of reinfection, this useful mechanism seems to be gradually lost again, although the other manifestations of resistance appear to persist.

The extreme symptoms which are so prominent in adult cattle are associated with a dropsy of the lungs. This occurs more frequently in older animals, or those in good condition, and in experimental animals may appear three weeks after first exposure to infection, or twelve days after the administration of infective larvae to an animal that has had previous experience of infection, provided sufficient larvae reach its lungs.

It would appear from these considerations that if an animal, which has had experience of moderate infection, is withheld from further contact with the parasite for a long time and then suddenly picks up many worm larvae, an appreciable number will succeed in migrating to its lungs. A local dropsy will result and give rise to violent symptoms, and most of the worms will be quickly eliminated while the few which remain will fail to grow. No larvae will appear in the dung and only a very small number of microscopic worms will be found in the lungs.

Causes of an outbreak

There is increasing evidence that the events in an outbreak of husk in adult cattle occur in the following sequence. In many outbreaks that have been investigated, the onset of symptoms occurred twelve days after the cattle were moved to what was evidently an infected pasture; often those animals which, for one reason or another, had been housed or otherwise kept away from infection until a few weeks before the outbreak, were the most severely affected. In no case did the evidence suggest that a gradual build-up of infection had taken place as between the cattle and the pasture. This point has been studied further in field experiments; these showed that infections in adult cattle and in calves were in no way referable to larvae which they themselves had passed on to the pasture, but depended entirely on the level of herbage infestation during the first few days no matter how high this might rise afterwards.

Within the last year, it has been possible to produce an outbreak experimentally in cattle that had already experienced infection. Lightly-infected calves were withheld from further infection by strip grazing over clean pasture and, subsequently, by yarding. After a year, they were put on a moderately-infected pasture together with previously uninfected control animals of the same age. Symptoms of disease appeared in both groups and the same proportion of each became severely affected, although larvae appeared in the dung of only the previously uninfected animals.

In nearly every case, husk in adult cattle can be attributed to the sudden exposure to a heavy uptake of infection of cattle which have had little or no contact with infection for a considerable time. Recent investigations throw some light on how this situation may arise.

Pasture the vehicle of infection

The pasture is the medium through which infection is transmitted from one animal to another, rather than the source of infection. Before the larval worms passed in the dung of infected animals are capable of infecting other animals, they must undergo development which takes some four or five days in warm weather. The larvae are delicate and particularly susceptible to desiccation; a population on a pasture therefore tends to dwindle rapidly, although humid weather, or the protection afforded by the micro-climate in a lush sward, may keep a pasture dangerous for two months or more.

The effective level of infestation on a pasture depends not only on the number of larvae present, but also whether these are so situated as to be available to the grazing animal. The larvae of the cattle lungworm are surprisingly inactive and make little effort to migrate out of the dung. Indeed, the results of careful observation have led to the view that to become infected, cattle must swallow dung. The extent to which they will do this depends on the manner in which the dung is spread over the herbage. Experiments show that grazing cattle will only avoid herbage contaminated by fairly obvious deposits of dung. Factors tending to spread the dung thinly over the herbage will therefore make the larvae more readily available.

The extent to which larvae in the dung become infective larvae on the herbage may vary greatly from one set of conditions to another. This is due

both to differences in the manner of distribution of the dung, and in the initial mortality of the larvae. Usually, initial mortality is extremely heavy. A palatable, rapidly-growing sward leads to loose dung and thereby greatly assists the contamination of the herbage; it also provides a humid microclimate which tends to reduce the initial mortality among the larvae. It appears that there is a connection between the rate of growth of the herbage and its effect on pasture contamination. High herbage infestations are most likely to appear, therefore, at certain times of year, or on certain types of sward. These conditions resemble, but are not identical with, those that favour the survival of an infection on the pasture. It should be stressed, however, that highly productive grassland is by no means indispensable to the creation and persistence of high herbage infestations.

The source of infection

The ultimate source of infection on the pasture is the dung of infected animals, and cattle can carry small numbers of worms in their lungs for a considerable period without showing symptoms. Under favourable conditions, the small numbers of larvae passed in the dung of such carrier animals can give rise to heavy herbage infestations. In less favourable conditions, light herbage infestations produced by the carrier animals can be built up by the action of susceptible young stock. These, though they may not become sufficiently heavily infected to show symptoms, may yet pass on to the pasture greatly increased numbers of larvae and so produce a dangerous herbage infestation. As has been shown, however, such young cattle will not be affected by the higher herbage infestation which they themselves have created. For this reason, it is not possible to deduce that a pasture is clean from the fact that young stock, presumed to be susceptible, have grazed it with safety.

It is very difficult to determine which pastures are clean and which groups of animals susceptible. After many outbreaks, the extensive movement of animals made in an endeavour to take affected animals from infected pasture, lead to unaffected, susceptible animals being exposed to infection. Since cattle which are clinically affected appear to be no longer susceptible to reinfection, it is best, when an outbreak occurs, to limit the movement of animals from pasture to pasture, as far as possible.

Living with the parasite

It will be evident from the facts discussed in this article that it is difficult to make recommendations for the prevention of husk. The complete eradication of lungworms from a herd or farm may, for a number of reasons, be regarded as not feasible. A lungworm-free herd could conceivably be created by the careful segregation of animals from birth and rearing them on clean pastures. The maintenance of such a herd in a worm-free condition would present insuperable difficulties. Carrier animals cannot be recognized, even by laboratory tests, and the mechanical introduction of infection is a real danger. When infection has been accidentally introduced it will not be a single animal but, at the very least, an entire age group that would have to be eliminated from the herd.

Clearly, it is necessary to try to live with the parasite and to ensure that every animal acquires and retains an adequate resistance. Since outbreaks are not the consequence of a steady, protracted increase in worm burdens, it is no solution simply to attempt to limit the number of worms picked up by the cattle. Research now being carried out has, as its ultimate aim, the design of husbandry methods which will expose animals to infection gradually, and ensure that they continue to be exposed to infection. It is clear also that control must be by grazing management rather than by grassland management, the question of which age groups share the same pastures, and how they do so, being of far greater relevance than the state or composition of the sward. Control measures must fit readily into the farming system and must not conflict with the requirements of efficient grassland utilization.

Though considerable advances have been made towards an understanding of the problem, specific recommendations on control measures are not yet warranted. In agricultural science a wide gulf not infrequently separates the understanding of a problem and its practical solution, and it will not be until field experimentation has been undertaken on an adequate scale, that pronouncements on the relationship between husbandry and parasitic worms will be possible or justified.

Reclamation of the Wieringermeer Polder—2

G. GRAHAM SAMUEL, M.SC.

This is the second part of the story of the reclamation of the first Zuyder Zee polder, and it concerns the wild life colonization of the newly-won land. The first article appeared in the June issue of *Agriculture*.

IN the June issue of this Journal, a brief description was given of the agricultural and social development of the Wieringermeer polder in Holland, based on the account in the commemorative book* issued for the twenty-fifth anniversary of its foundation. There is, however, a lot of interesting information in this volume besides that on agricultural and social development. It is greatly to the credit of the Dutch that in spite of their preoccupation with the practical problems of draining, subdividing and bringing into cultivation such huge areas of new land, they nevertheless found time to make systematic observations on a number of questions of general and scientific interest.

Archaeological studies were made on the scanty remains of the villages of the Middle Ages that were inundated by the seas between the ninth and four-

* *Wording en opbouw van de Wieringermeer*, published by H. VEENMAN and ZONEN, Wageningen, 1955. 15 *guilders*.

teenth centuries. Little trace of the houses remained, probably because they were largely built of wood or mud; but circular, boarded wells were found, often filled with fragments of unglazed and glazed pottery. Some of the latter could be dated approximately and connected with sources in France. The foundations of only one stone building were found and this appeared to have been a church, for there were stone coffins near by and some headstones. The only later remains were the wrecks of ships which were probably sunk in storms as they sailed the Zuyder Zee.

Besides these archaeological studies, made as soon as the land was drained, botanical and zoological studies were undertaken in the early years of reclamation. Here were 50,000 acres of sea bottom suddenly laid wide open to colonization by plants, insects and animals. It is not often that an opportunity to study the effects of disturbances in the "balance of nature" presents itself on such a grand scale.

The first plants

The first plants to establish themselves between the pools of water left by the pumping were fairly thinly spaced, and there was every indication that some of the seed must have been present in the soil before the sea was pumped out. All were plants that could tolerate salt, such as the Sea aster (*Aster tripolium*), Sea blite (*Suaeda maritima*), *Atriplex* species, reed (*Phragmites communis*) and Sea club rush (*Scirpus maritimus*). On slightly raised sandy banks a much richer flora was present, partly because the soil was more quickly leached in such sites, but probably also because they were often the resting places for birds, whose droppings usually contain a wide variety of seeds.

Even in the year when the polder was first pumped dry, ninety-nine species of colonizing plants were identified. Within two years this number had trebled and as many as thirty-four species were listed as extremely abundant and widespread. The polder was then fairly thickly covered with wild vegetation, much of it knee- or even waist-high. Growth was luxuriant, as rain had already sweetened the soil a little and nitrogen was available as a result of the growth of soil micro-organisms. In subsequent years, partly because of exhaustion of the nitrogen and partly through severe competition between the immense numbers of seedlings, growth was more crowded but less vigorous.

The first plants to become established were mainly annuals. Even the Sea aster, which in other situations usually grows as a biennial, behaved at first in the Wieringermeer as a summer annual. In autumn, its masses of seed heads and wind-blown seed adhering to other plants were a conspicuous feature. However, the early, salt-tolerant colonizers were soon followed by grasses and weeds such as annual meadow grass (*Poa annua*), Yorkshire fog (*Holcus lanatus*), meadow grass (*Poa pratensis*) and *Cerastium* species. In favourable spots the vegetation quickly began developing towards a natural, dry grassland. In wet spots, however, there was a luxuriant growth of reeds, which provided ideal shelter for the many water birds.

Within a few years, most of this naturally established flora was to disappear beneath the plough, but then a further source of plant colonization became evident, namely, weeds brought in with agricultural seeds. Such

weeds as groundsel, shepherd's purse, goosefoot, annual and perennial thistles and other perennial weeds soon appeared and became a considerable nuisance. Some of the most troublesome were coltsfoot, sow thistle and creeping thistle, which besides being distributed by seed were also spread by ploughing and harrowing. The lessons gained from weed invasion in the Wieringermeer polder were put to good use in the subsequent draining of the north-eastern polder, where improved methods of weed control were adopted and proved of considerable value.

The colonization of the new area by fauna—insects, birds and animals of various kinds—followed a pattern rather similar to that of the plants. The area was quickly invaded by active species, which multiplied rapidly in the early stages and subsequently declined as competition became keener.

Plagues of insects

Perhaps some of the most striking examples of rapid development were among the insects. There were successive plagues of midges, mosquitoes, leatherjackets and even of fleas. The fleas became worse in the summer of 1934, before most of the area had been subdivided and settled. Fortunately they did not remain troublesome, but for years midges (*Chironomus* sp.) occasionally reached plague proportions and are still at times a considerable trial to the inhabitants. Spiders also abounded.

There were also insect plagues on the crops. The most notable were in 1946, when the caterpillars of two species of moth, the Diamond-back moth (*Plutella maculipennis*) and Silver Y moth (*Plusia gamma*), caused great damage. Both plagues occurred at about the same time and it is possible that they were connected with the flooding of the polder the previous year, which may have destroyed some natural enemies.

The plague caused by the Diamond-back moth was first noticed in the last week of June, 1946, and reached a peak in the first week of July. The main crops affected were cabbage, turnips, rape seed and other crucifers. The second generation was severely reduced by a parasitic ichneumon wasp, but was also combated by spraying.

The greatest damage was caused by the caterpillars of the Silver Y moth, especially in the first and second weeks of July. They moved in large numbers from field to field, attacking practically all crops with the exception of cereals and grasses. Clovers, field beans, peas, spinach, flax, maw-seed, radish, summer colza, yellow mustard, caraway, lettuce, and carrots were all affected. Sugar beet suffered only near the margins of the crops, but in the outer five to ten rows practically all the leaves were consumed. Potatoes were not greatly injured, except near the edges of the crops; it was noticed that the caterpillars preferred the varieties Noordeling and Red Star to other varieties. By the end of the second week of July, many of the caterpillars were attacked by a parasitic ichneumon wasp and also by bacterial and fungus parasites. After the middle of July, live caterpillars were scarcely to be seen—only great numbers of dead, black and shrivelled specimens on all the crops. The second generation did not cause damage of any importance.

Birds and mammals

The newly-drained polder was a paradise for birds, especially water birds and waders. They were attracted by the many pools and banks of sand and shells. Visiting naturalists were thrilled at the sight of huge numbers of birds of varied species, some in very large colonies. Some that are mentioned are herring gull, black-headed gull, great black-backed gull, snipe, ruff, teal, redshank, sandpiper, grey plover, cormorant, wild duck, shelduck and even little tern and avocet.

As time went on and the work of reclamation and cultivation progressed, big changes naturally took place in the bird life on the polder. The environment gradually changed to cultivated fields, pastures and human dwellings, and birds at home in these new surroundings soon replaced the big populations of water birds. Large numbers of owls followed plagues of mice. A section of the polder where the ground was poor and sandy had, fortunately, been set aside as a nature reserve, where many species of birds of interest to naturalists still find a sanctuary.

The first mammals to colonize the polder, like the insects and birds, multiplied very quickly. There was a serious plague of rats in 1933, and when a price was put on their tails some of the men at work on the polder brought in more than a thousand tails each. There were also plagues of mice in 1933 and 1934, both in houses and fields, but, as previously mentioned, these were quickly followed by owls, as well as by stoats and weasels, which soon reduced their numbers. In 1936 and 1937, hares developed almost to plague proportions; the first invaders had found ample room and shelter and did not take long to multiply. The polder was then divided into ten hunting divisions and large drives were organized to reduce the hare population. Indeed, it was reduced so effectively that a few years later, new hares from Poland were imported and released. There had already been a liberation of Polish partridges and of pheasants.

The slower-moving members of the animal kingdom took much longer to colonize the polder. Even in 1933, frogs and toads were found only on allotments round the margins, but they gradually spread over the whole area. Slugs and earthworms were slower still, but even these have now populated the entire polder.

This story of wild-life colonization occupies but a few pages of the commemorative volume describing the origin and development of the Wieringermeer polder. Other scientific work undertaken included studies on soil classification and soil chemistry, soil drainage and desalination, microbiology and inoculation for the growth of leguminous crops, and crop and grassland establishment. Combined with the record of practical accomplishments in agriculture, engineering, and social and economic development, which are told at much greater length, the whole makes this book an inspiring record of one of man's most impressive accomplishments in his struggle against the forces of nature.

The author is grateful to members of the staff of the Wieringermeer Administration for assistance in compiling these articles and for permission to reproduce the photographs accompanying the first.

Potato Blight Control in North America

A. E. Cox, B.SC.

National Agricultural Advisory Service, Eastern Region

Organic fungicides and special equipment which minimizes mechanical damage to potato tops, are helping the N. American grower to maintain high yields.

POTATOES are an important crop in North America. In the U.S.A. about 1½ million acres of potatoes are grown each year and in Canada approximately 300,000 acres. Conditions vary widely throughout the continent, but one major difference between potato growing there and in Great Britain is the shorter growing season—usually not more than 120 days—of late (maincrop) varieties in N. America, as compared with the 150–160 days here. The short growing season is a reflection of a long, severe winter, and allied to this is a limited harvest period, when the potatoes have to be lifted before hard frosts damage the tubers in the ground.

Potato blight (*Phytophthora infestans*) is most serious in the north-eastern area of the U.S.A. (Maine), and in the maritime provinces of eastern Canada (Prince Edward Island, New Brunswick and Nova Scotia). The cool, moist summers there give potato-growing conditions like those in Great Britain; for example, Aroostook County, Main, and eastern England have a similar range of summer temperatures. The average monthly rainfall during the growing season is high, approximately 3½–4 inches: in our potato-growing areas in the Fens it is 2–2½ inches.

The well-distributed summer rainfall in this part of N. America, together with the cool temperatures and well-drained, sandy soils, make for ideal potato-growing conditions. The extent to which the disadvantage of a short growing season is overcome is illustrated by the high average yield of 10 tons per acre obtained in Aroostook County. But potato blight is also encouraged. For example, severe blight occurs in Aroostook County one year in two, and in Prince Edward Island, where humidity conditions are higher, three years out of four. It is only by following a vigorous blight control programme that growers can get such high potato yields. Southwards and westwards across the continent, weather conditions become generally less favourable to potato growing and to blight.

Organic fungicides for blight control

One of the chief features of potato blight control in both the U.S.A. and Canada is the preponderant use of organic fungicides, which have largely replaced copper sprays in recent years. The main materials employed are sodium, zinc, and manganese salts of a dithiocarbamic acid, commonly known as nabam, zineb and maneb or, collectively, as the "carbamates". Nabam (disodium ethylene bisdithiocarbamate) sold commercially in N.

America as Dithane D.14, Thiogreen and Parzate is the most commonly used compound either alone or with the addition of zinc sulphate.

The main advantage in the use of organic fungicides is that they have no phytotoxic effects on the potato tops. It has been reported from many parts of N. America that spraying with copper in a hot, dry season can damage haulms and lead to decreased yields. By using organic sprays, the N. American farmer who follows an annual control programme against blight, has overcome the problem of depressing potato yield in the no-blight years. The main disadvantage of these materials is their poorer adherence to the potato foliage and the consequent need for more frequent application than is the case with copper sprays. Copper is still generally recognized as giving a more effective control of the disease in really bad blight years, and when these occur, there is a marked tendency for growers to resort to copper sprays again. However, a series of trials carried out in recent years under the severe blight conditions of Prince Edward Island, has shown that maneb can achieve a degree of control comparable to that obtained with Bordeaux mixture.

The combined effect of the short growing season and limited harvest period has exposed potato growers in N. America to a source of loss from blight, which is much more important there than in Great Britain. This is the loss which arises from tuber infection with the disease, caused by the potatoes coming into contact with blighted haulm at lifting time. In Great Britain, the majority of maincrop potato tops have died down completely, before harvest.

In the bad blight areas, the N. American farmer's answer to this problem has been an intensive control programme aimed at keeping his potato tops as nearly free from blight as possible. In Aroostook County, for example, it is usual for six or seven spray treatments to be given a year against blight, but in bad blight years, individual growers may apply as many as twelve treatments. Spraying starts before the crop meets in the drill, and continues until lifting time.

Specialist growers with special equipment

There are other reasons which make the growers spray conscious. Many of them, particularly in the important potato areas, are potato specialists; when they grow other crops, they do so primarily to give the land a rest from potatoes or to build up soil fertility; they keep no livestock. There is also the specialist who produces a summer crop in the north, and then moves south with his equipment to grow a winter crop. One result of this specialization is that nearly all growers have their own spraying equipment and, concentrating most of their efforts on one crop, wish to make the best possible job of it. In addition, there is the need to deal with a wide range of insect pests (Colorado beetle, flea beetle, leaf hoppers, etc.), so that in the potato-growing areas of N. America, spraying would be carried out even in the absence of blight. The insect pests are treated chiefly with DDT, which can be combined with the organic or copper fungicides. So called "early blight", caused by the fungus *Alternaria solani*, can also be a problem, but spraying gives effective control.

It might be supposed that considerable mechanical damage would be done to the potato tops by the large number of spray treatments given, especially

as spraying often continues up to harvest. However, growers appear to have cut down to a minimum the losses normally associated with spraying. They grow their potatoes in wide rows (36 inches), and fit wheel guards (crop lifters) to their tractor and spraying wheels. Incidentally, these guards are usually home-made. Another factor minimizing wheel-damage losses is the growing of potato varieties, such as Katahdin and Red Pontiac, which stand up straight until harvest time.

In general, high-volume spraying (100 gal per acre) is used; but in Maine, low-volume spraying (35 gal per acre) has gained rapidly in popularity over the last few years, and now 70 per cent of the growers there are using the method. Dusting is carried out in a few areas of N. America where water is scarce, but spraying is recognized as being the more efficient technique.

Top spraying of the potato plants without the use of drop lances is more or less universal. The growers aim at protecting the lower foliage by starting the spray programme early. At present, little use is made of aircraft in spraying control of potato blight, except in the wide expanses of the Red River Valley of Minnesota and N. Dakota, where a high proportion of the fungicides is applied from the air.

Search for resistant varieties

A number of "blight-resistant" potato varieties, derived from *Solanum demissum* hybrids, have recently come into commercial cultivation. Of these, the best known have been Kennebec, bred in the U.S.A., and Canso and Keswick produced in Canada. Experience has shown that within a year or so of their introduction, these varieties have been attacked by new specialized races of blight, but because they possess other desirable commercial properties, farmers have continued to grow them. Little hope now remains that breeders will be able to produce, by using so called "major gene" resistance, a resistant variety that will last an appreciable time. Much more importance is now attached to "partial" or "field" resistance, the exact genetical basis of which is not yet fully understood. Varieties possessing a high degree of "field" resistance are attacked by the blight fungus, but the course of the disease on the plants is much slowed down. The important thing about this resistance is that, so far as is known, it is not affected by specialization in the blight fungus.

The practice of haulm-killing is now widespread, and most of the work on this subject has been reported in the last ten years. Of the various methods used, spraying with sodium arsenite or with the di-nitro compounds, in particular dinoseb (DNBP), is the most common: Killing the tops can also be achieved with chemical dusts (such as calcium cyanamide), by roto-beaters and flame burners. A few years ago, much was written about vascular discoloration and a browning of the stem end of tubers in crops treated in this way. There is a good deal of conflicting evidence on the causes of this. In general, however, workers appear to be agreed that one of the principal factors involved is the speed with which the tops are killed: the faster the rate of killing, the more likely is discoloration to occur. At present, discoloration of the tubers brought about by haulm-killing appears to be of little importance in N. America, and this may be associated with a greater use of sodium arsenite, which kills the tops slowly.

Haulm-killing can largely dispose of the problem of tuber blight infection at lifting time, and it may well be that widespread adoption of the technique will cause the N. American growers to modify their present intensive spraying programme against blight.

Relevance to Great Britain

Recent work on blight control in Great Britain has shown that, particularly in eastern England, the increased yields produced by spraying against the disease in "blight" years may be offset to some extent by the losses incurred as a result of wheel damage and phytotoxic effects when spraying is carried out in the "no-blight" years. We could perhaps pay more attention here to crop-lifters fitted on the tractor and sprayer wheels, although they appear to be better suited to the wider row width used in N. America than that adopted here.

Losses from phytotoxic effects due to spraying potatoes with copper fungicides in a hot dry summer in Great Britain should not be exaggerated, but they certainly occur, particularly in association with insect damage. To prevent this loss, there appears to be a good case for giving the organic fungicides a trial, although their poorer adherence to the potato foliage (with the possible exception of maneb), should be remembered. The organics may be found useful for the first precautionary sprayings where a farmer follows a routine annual spray programme against blight. In "no-blight" seasons they will do no harm; in the "blight" years, they should hold the disease in check, and it may then pay the grower to change to a copper fungicide for his final spray treatments.

★ NEXT MONTH ★

Some articles of outstanding interest

THE MERINO *by Allan Fraser*

INTENSIVE RATIONS FOR LAYING HENS *by K. J. Carpenter*

COMMERCIAL ANEMONE GROWING *by Wilfred C. Ibbett*

GAME BIRDS ON THE FARM *by A. D. Middleton*

To Norwich in the Morning

S. R. O'HANLON, M.B.E.
Editor, "Agriculture."

"To Norwich in the morning, and from Norwich to London during the day, carrying with me great admiration of and respect for this county of excellent farmers, and hearty, open and spirited men. The Norfolk people are quick and smart in their motions and in their speaking. Very neat and trim in all their farming concerns, and very skilful. . . . In short, it is a county of most excellent cultivators." Such was William Cobbett's impression of Norfolk in December 1821, the more compulsive of attention because his uncompromising pen was slow to praise and quick to condemn. And were he to return to Norfolk today, he would have no cause to detract a single word from his encomium, for these fertile acres are still the silent witness of good husbandry—a husbandry cradled in tradition and matured in progress.

We too came to Norwich in the morning, passing through the pronounced arable pattern of the county's present-day farming, on the way to England's premier agricultural show. This was the Royal's fourth visit to Norwich, the earlier shows being held in 1849, 1886 and 1911. This year the Royal Agricultural Society of England was the guest of the Royal Norfolk Agricultural Society on its permanent showground at Costessey (pronounced "Cossey" for the greater confounding of "foreigners"!) some six miles from the city. But although another 85 acres had to be taken in to contain the now-accepted immensity of the event, this year's show was much more compact than usual—for which everyone was grateful.

From first light, the activity of feeding and final grooming of stock (to say nothing of the stockmen) foreshadowed the judging which began at nine o'clock. All told, over 2,500 animals were presented. There were more cattle, more pigs and, surprisingly, more horses than last year, but sheep numbers were down by a hundred or so. Cobbett would have lifted an eyebrow at that. Around the cattle-judging ring a vanguard of informed opinion had already gathered to speculate and prophesy, to enthuse over their favourite breeds and challenge the judge's selection *sotto voce*. The splendid Hereford bull "Noble Sam" (shown by C. E. Rudge of Ross-on-Wye) moved into the spotlight as supreme herd champion and subsequently named by the breed society as "Bull of the Year". Captain de Quincey's "Vern Ivan", which beat in his class both the Bath and West Champion and the Three Counties' Reserve Champion, was placed reserve. "Noble Sam", bred in Ireland, was bought by Mr. Rudge in 1954 for only 350 guineas.

On Thursday, the Burke Trophies for pairs of beef and dairy cattle again went to Aberdeen-Angus and Friesian respectively—the third win for both breeds.

The Duke of Edinburgh, this year's President of the Royal Agricultural Society of England, flew in by helicopter on the morning of the first day and was everywhere to be seen tirelessly taking both an avid and a knowledge-

Photo: *Eastern Daily Pre*

Royal Show, Norwich. Final grooming foreshadowed the judging at nine o'clock.

Horse Collar Making (Article on pp. 238–9)

The beginning of the day's stint of one horse collar. The damped leather strip for the forewale is folded over and tacked into position.

A special clamp is used to hold the leather strip firm and enable the collar maker to have both hands free to work with the awl.

Photos: *John L. Jones*

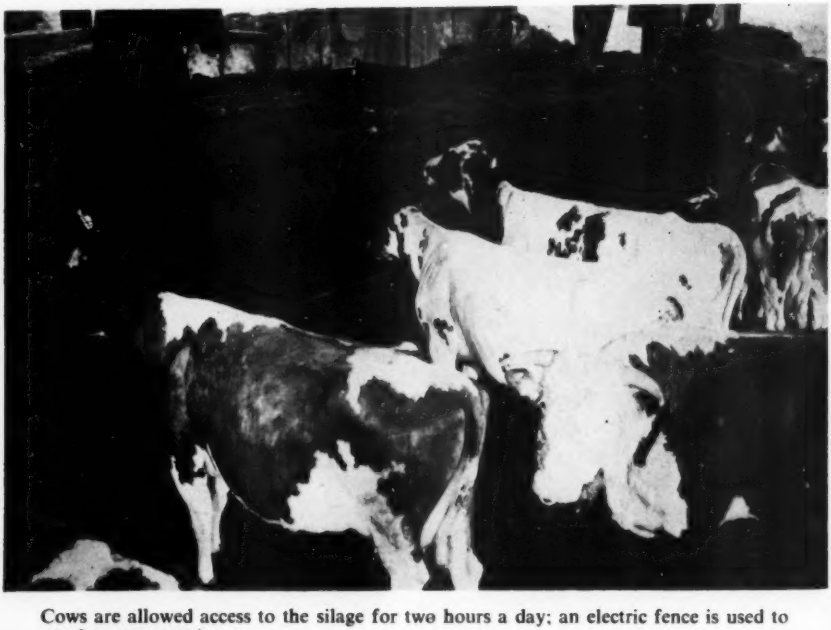
Here the master bundle of rye straw is in position and being loosely stitched to the shape of the fore-wale. Much of the work is done with the collar resting on the maker's knee, so leather kneecaps help to take the wear and tear on trousers!

The finished article, strong and symmetrical—made from a mass of loose materials in just one working day by a master craftsman.

Photos: *John L. Jones*

Limited Self-feeding of Silage (Article on pp. 218–21)

Silage is made to a depth of five feet in a surface silo in a Dutch barn adjacent to the shippon.



Cows are allowed access to the silage for two hours a day; an electric fence is used to regulate consumption.

able interest in all that was going on. Indeed, taking time by the forelock, he was also on the showground on the eve of the show. He accompanied Her Majesty the Queen on a three-hour tour on Wednesday, staying on until late in the evening, and was here again on the morning of the last day. The novel new trophy which the Duke has presented for competition by stockmen has been widely acclaimed for the recognition which it confers upon the supremely important part played by these painstaking and often all-too-modest attendants of Britain's show aristocracy. The cup, which was won by Mr. Dennis Bent of Hereford, is awarded outright to the stockman—who must be a weekly wage-earner in charge of animals exhibited at the Royal Show—securing the highest points in a competition which embraces the judging of stock, the assessment of feedingstuffs and tractor driving.

The Princess Royal spent over two hours on the first day watching the judging of the Red Polls, among which were animals from the Queen's Sandringham herd. On their home ground, it was no surprise to see an extremely good entry of this breed, and the judges had no easy, or indeed enviable, task in placing the animals lined up for them. "Kirton Popular", shown by P. Adams and Sons, secured male champion and the Australian Cup. The best Red Poll female was "Mistley Divine Penny 2nd", shown by Brooks (Mistley) Ltd.

The handsome British White cattle, essentially nowadays another product of East Anglia and no strangers to the Costessey showground, made a first national appearance at this year's Royal. From the twenty-three exhibited, C. R. Birkbeck's "Hevingham Spearwort" was nominated supreme cow and Buxton and Birkbeck's "Hevingham Stonehenge" champion bull. This breed has a history stretching back to pagan Celtic times, when a white bull was calculated to make quite the very best of sacrificial offerings. In the Middle Ages, these cattle were fairly common, and it is on record that Breconshire sent four hundred of them to the court of King John as a peace offering.

The Royal continues to be a great occasion and an impressive annual feature. When, as this year, it has the blessing of ideal weather, the skill and prosperity of British farming in all its facets are shown to their full advantage. Cobbett would have been pleased about that.

Postscript

It is learned at the time of going to press that "Noble Sam", like many another ambitious youngster, has heard the advice "Go west, young man!" He has been sold to a partnership of American farmers, each of whom will have the use of the bull for six months in each year in Texas, Kansas and New Mexico. The price, which was not disclosed, is understood, however, to be in the four figure class.

Horse Collar Making

JOHN L. JONES

The methods employed may vary from region to region, but the craftsmanship and pride in a job well done are common to all the workers in the now sadly diminishing race of horse collar makers.

THE craft of horse collar making is a specialized and laborious one, quite distinct from those of the black or brown saddlers. The collar maker is never a saddler, though the saddler may lay claim to being able to make a collar. A good experienced maker—and most of them are septuagenarians or over—can fashion and finish a collar in a single day of hard work.

Ideally, the collar maker would wish to measure his horse before fashioning the collar, and for the average gelding of the medium heavy breeds the measurement would be from nineteen to twenty-three inches from the neck to the throatpiece. The fit at the horse's withers should be such as to just permit the insertion of the flat of the hand between the collar and the neck.

The collar maker's workshop, with its distinctive tools such as the nicked collar ram rods, the mallets and awls, the bench and the polished wooden block sunk in the floor, is likely to be a profound mystery to our younger people. The basic materials of the craft are good hide and barathea, seaming twine, rawhide thong and the best combed rye straw.

The collar is made in two parts, first the forewale or ring, and then the body. For the forewale, a leather strip is used, seven inches wide and eight inches longer than double the length of the collar. Stretched along the bench, this is folded over and tacked, with a half-inch "barge" left on one side to tack the lining. The leather is stitched to the lining with the best rawhide thong through holes made with the diamond spotting awl and the end of the first stage leaves the maker with an empty tube for stuffing with the rye straw.

Then begins the heavy, skilled work of ramming the rye. The craftsman places the empty tube on the block and holds it in place with his foot two and a half inches from the middle. The first wisp of rye straw is then nicked into the end of the collar rod and pushed down—not too hard to begin with, because the straw must be able to splice with that inserted from the other side. The subsequent wisps are rammed home hard and true from each side and hammered, with a seven-pound mallet on the sunken block, to ensure even distribution. At the same time, it is being continuously strained and shaped by moulding, turning and pummelling on the craftsman's knee. The shaped forewale is then stitched together at the top and the straw trimmed off.

The making of the body to which the forewale is attached requires, perhaps, the principal skill of the craft, for this is the part that lies on the horse's neck to give comfort when at rest, and also when the shoulders are straining and swelling under a heavy load. The first handful of straw is stitched in position in the centre of the throatpiece (which is a four-sided piece of leather two inches at the base and widening to three and a half inches at the top), and the master bundle of rye straw is then spliced on both sides, shaped

to the collar and stitched across. Then the hard work begins again—ramming the rye, malleting, shaping, straining, moulding, building the swell at the base for draught, adjusting the flock for greater comfort and ease at the neck, stitching, lacing, trimming—until the collar takes final shape with the nose-cap and side pieces which will help protect it against the wet.

The forewale is as hard and smooth as a piece of planed ash and the collar, though able to take a ton load, will yet sit snugly and kindly on the horse, able with periodic maintenance to withstand the sweat, strain and weather erosion of years.

The craft of the collar maker, like the power which he has served over the long years, is now almost extinguished. The craftsman featured in the illustrations on the centre pages of the art inset, has just retired at the age of eighty-two. He is, I believe, the last remaining practitioner of the craft in the west of England.

Peatland Improved by Oversowing

A. L. GARDNER, B.SC.(AGRIC.), M.S., N.D.D.
West of Scotland Agricultural College

Trials in Scotland have shown that oversowing can help to increase the stock-carrying capacity of peatland.

THERE are many acres of peatland in Britain today which are contributing little or nothing towards our agricultural output. These areas carry a herbage of heather, sedges, blaeberry, bog-myrtle, blue moor grass and other grasses of low productivity. In addition, the natural fertility is extremely poor and in many cases drainage and fencing are prime necessities before normal cultivations can be contemplated.

The cost of a reclamation scheme which would make such land fit for rotation cropping would be prohibitive, and in any case much of this territory is in remote areas of high rainfall and unsuitable for ordinary farm rotations. Therefore, any improvement must be aimed at replacing the existing herbage by more productive species. The quickest way of doing this, if it were practicable, would be to plough or cultivate to produce a seedbed, and then reseed directly. This method has two main disadvantages. First, on undrained peat the cultivations would break up the surface mat and the sow-out would suffer severely by the poaching of stock. Secondly, as a result of the changes in the vegetation, a high level of manuring would be necessary to maintain the sown species. Failing this, reversion to a herbage of less value than the original will take place.

By adopting an oversowing technique, the solid surface mat, which is also the most fertile and biologically active layer, is retained on the top. The herbage change following oversowing is not so dramatic as that following a direct reseed, but it will be more permanent because the tendency to reversion is slower even in the absence of the annual application of fertilizers. There is

also the insurance that, if subsequently neglected, the end point of the reversion will not be below that of the original herbage!

Various trials have been carried out in the west of Scotland over the past few years to observe the effectiveness of oversowing under varying conditions. Most of these trials have been variations of the technique evolved by Mr. A. B. Allan of Muirfad, Newton Stewart. Mr. Allan's method is as follows:

1. Apply 2 tons per acre of lime and basic slag at any convenient time prior to seeding.
2. Broadcast, on the undisturbed surface, 1 cwt per acre of grass and clover seed cleanings in early spring.
3. Allow stock access to the treated area throughout the establishment period.
4. If a fairly large acreage is to be reclaimed, attempt only a few acres in any one year.

The results of this treatment have been published previously,* but a brief summary will bring out the important features. The original herbage on the peat at Muirfad was composed chiefly of heather, deer's hair grass, sedge and associated plants. The cover was not dense, being on most areas not more than 3–4 inches high. Within two years of treatment, the heather and deer's hair grass had completely disappeared, their place being taken, in the main, by Yorkshire fog, smooth-stalked meadow grass and wild white clover. In terms of dry matter, the production in the second year following treatment amounted to 3,218 lb per acre, compared with 886 lb per acre from the original herbage. The increase in stock-carrying capacity on the peat area and adjoining fields resulting from the improvement of the peat area was quite substantial. The ewe flock (black-faced) increased from 60 in 1947 to 165 in 1953, while cattle (Blue-grey cows and calves) went up from 4 to 25 during the same period.

When interpreting these results, it should be remembered that they were achieved on a coastal area at sea level. Under more adverse conditions, a similar level of production would not necessarily follow, although the increase relative to the original herbage would be just as great.

Rain and stock play their parts

Certain features of Mr. Allan's methods—the early sowing of seed, the uninterrupted grazing and the treatment of only a small area in any one year—are of the greatest interest. By sowing the seed early, at the end of February or beginning of March, the young seedlings are given a chance to become established before the natural herbage is in full growth. Also the rain that can be expected at that time of year encourages germination and heavy rain, by its force on impact, helps in the consolidation of the seed. As the stock are allowed access to the area at all times, their treading is another factor in the consolidation and their grazing lessens the competition from the existing herbage.

The treatment of only a few acres each year has two advantages. First, the stock tend to graze the area that has been fertilized so that the necessary

* The Muirfad Technique of Peatland Improvement. A. L. GARDNER, I. V. HUNT and I. W. MITCHELL. *J. Brit. Grassland Soc.*, 1954, **9**, 161–71.

stock intensity is achieved. Secondly, the gradual improvement of the whole area can be matched by a similar increase in stock without sudden capital outlay. None of the subsequent trials was designed to provide for statistical reduction of the findings, but from the observations made, it is clear that the amount of surface moisture present and the intensity of stocking, have the greatest influence on the rate of herbage improvement; these two factors are related, and to a degree, interchangeable.

Without moisture, seed will not germinate and grow, and when sown among plants that are already established, the competition for moisture can become critical. This is why the best results have been obtained where water, slightly in excess of that required by the existing plants, has been present. Where grazing reduces the amount of leaf on the already established plants, it not only allows more light to penetrate to the seedlings, but also reduces the water requirement of the mature plants. Thus on dry peats or mineral soils, which lack moisture in the surface layer, the establishment of the sown species is greatly assisted by the grazing animal. This interrelation of surface moisture and grazing has been clearly demonstrated in several places, and it may be said that where there is a generous supply of moisture the grazing can be reduced.

Seeds and fertilizers

Both seed cleanings and pure seed have been used, and one appears to be as successful as the other; the choice between them will depend on cost. If good cleanings, containing a fair percentage of viable seeds, can be obtained cheaply, then they should be used in preference to pure seed. Wild white clover cleanings should always be included and the bulk made up with rye-grass, timothy or cocksfoot cleanings. A pure sowing of 10 lb cocksfoot and 2 lb wild white clover per acre has also been used successfully.

In the trials where various combinations of lime and slag have been used, it was obvious that lime alone was of no value, slag alone was fairly good and lime plus slag the most effective. It would appear that under very favourable conditions rate of application can be reduced from the 2 tons each of lime and slag used at Muirfad, to half these quantities. At one centre, ground mineral phosphate and potassic mineral phosphate were equally as effective as slag. Where the conditions are most favourable for rapid establishment of the sown seeds, an application of 1–2 cwt per acre of a nitrogenous fertilizer has greatly stimulated the growth. Further dressings of nitrogen are not advised because of the danger of suppressing the clover.

If the original herbage is very dense and the soil dry, the seeds may fail to establish. Under these conditions the cover should be reduced by burning or cutting, followed by immediate sowing of seed and fertilizer.

To sum up the advantages of this technique of oversowing as applied to peatland, it can be said that with the necessity to fence removed and the need for drainage reduced to a minimum, the available funds can be spent on lime and fertilizers. In this way little fixed capital is required for an improvement scheme which can greatly increase the productivity of rough grazings.

The writer wishes to express his thanks to the several farmers who made areas of their farms available for the trials referred to in the text, and to the County Advisers of the West of Scotland Agricultural College who selected and laid out the trial areas.

Machine Plucking of Turkeys

J. SHEMTOB, N.D.P.(HONS.)

National Institute of Poultry Husbandry
Harper Adams Agricultural College

Mechanical plucking followed by wax stubbing can reduce labour costs and produce a better finished carcass.

To cut down marketing costs and give consumers a cheaper product, it is becoming increasingly necessary to introduce mechanical appliances in the processing of turkeys. A high proportion of the turkeys dealt with in the United Kingdom each year are still plucked and stubbed by hand. This method is lengthy and laborious, and skilled pluckers are becoming more difficult to find and more expensive to employ. Alternative methods of defeathering and pinning are, however, gradually coming into use and gaining favour.

Most dry plucking machines are driven by electric motors and used to rough pluck the main body feathers after the larger quill feathers have been extracted by hand. When the bird is held against the revolving plucking drum, the feathers are drawn in by a suction fan and seized by a series of gripping members capable of 3,000 to 6,000 "plucks" a minute. The feathers pass to the back of the plucker and are delivered either into a sack or a feather-room. Stubbing and finishing are usually done by hand. This type of machine was developed about 1930 and several improvements have been introduced from time to time to increase its efficiency. At present, various models are available, each dealing with a specific part of the defeathering operation, such as removal of the wing and tail feathers, taking off the body feathers, and disposing of the stubs.

Wet plucking was introduced after the war and soon became established as the main commercial method of plucking chickens and boiling fowls. In this process, a lapse of two minutes is allowed after killing for reflex action to cease; the birds are then scalded and defeathered over a rubber-fingered, revolving drum, which removes most of the body feathers, leaving only a few on the wings and tail and a proportion of the stubs, to be finished by hand. Little skill is required to operate these machines, and the quality of finished carcasses is just as high as if the birds were hand plucked. Compared with hand plucking, about fifteen times as many birds can be dealt with by an equivalent labour force. The method of scalding generally preferred is "semi-scalding" in water at 130°F. "Sub-scalding" in water at 140°F has the disadvantage of removing the outer layer of the skin, so that the carcass requires wet cooling (not often practised in this country) and then wrapping in a protective film to prevent dehydration. Only a few enterprising producers have so far adopted scalding at either of these dip temperatures.

When the use of shale oil paraffin wax for stubbing chickens was developed at Harper Adams, it was found that there was a marked improvement in the

bloom of birds so treated, and an appreciable saving in labour in comparison with hand pinning.* Wax has a double purpose: in the hot state it scalds, relaxing the muscular grip on the feathers and stubs; in the cooling process, the stubs adhere to the wax and so can be removed easily in large numbers when the cast is broken and peeled off.

Although these techniques of plucking and stubbing are becoming general practice in the processing of chickens and fowls, until now they have not been applied so confidently to turkeys.

Investigation at Harper Adams

An investigation was carried out at the National Institute of Poultry Husbandry to compare the different techniques of defeathering and pinning turkeys in relation to labour requirements and the appearance of the finished carcass. One group was hand plucked, a second was plucked dry on a machine, and a third was semi-scalded for 18–20 seconds in water at between 128 and 130°F, and then rough plucked with a rubber-fingered machine with a 14-inch horizontal drum. Each group was subdivided into five birds to be stubbed and finished by hand, and five to be wax stubbed. The birds were bled by an internal cut which severed the jugular vein, and plucking was begun immediately after reflex action ceased.

The method of wax stubbing consisted of leaving the rough-plucked carcasses to air-cool for thirty minutes and then dipping them for two seconds in molten paraffin wax at temperatures of 130–135°F. After allowing the surplus wax to drain, the carcasses were transferred to a cold water chilling tank for about five minutes to allow the wax coat to harden. The coating was then broken by hand and the cast (wax and stubs) stripped off with a rubber-fingered plucking machine. Very little hand finishing was necessary after this stage.

The following table summarizes the time required for these various methods of plucking and stubbing:

Number of turkeys	Method of plucking	Average time to rough pluck one turkey	Method of stubbing	Average time to stub one turkey	Average time to clean pluck one turkey	Relative time required to clean pluck one turkey compared with wet plucking and wax stubbing
		min		*min*	*min*	*min*
10	Hand	12·5	Hand	14·5	27·0	4·03
			Wax	7·0	19·5	2·91
10	Dry plucking machine	1·8	Hand	22·0	23·8	3·55
			Wax	10·8	12·6	1·88
10	Wet plucking machine	1·4	Hand	8·4	9·8	1·46
			Wax	5·3	6·7	1·00†

†Does not include time taken to reclaim wax.

* Methods and Economics of Table Poultry Processing and Packaging. H. Temperton, May 1954. A paper read to the National Association of Poultry Packers Ltd.

The appearance of the clean-plucked turkeys was judged by an independent panel, who showed a consistent preference for birds which had been wax stubbed. These carcasses had a better finish and more bloom on the skin.

The time taken for hand stubbing varied considerably. When the birds were rough plucked with a dry-plucking machine, most of the fleshy stubs were either broken off or crushed. This made the subsequent operation of hand-stubbing more difficult and slower. Further, some of the black feather pigment was unavoidably smeared over the carcass. To a less degree, the same difficulty applied to the hand-plucked turkeys. Semi-scalding before plucking made stubbing work much easier by relaxing the feather follicles. When the turkeys had been rough plucked either by hand or machine, the subsequent use of wax approximately halved the labour required for finishing, compared with the removal of the pin feathers by hand.

These exercises show that wax stubbing can be employed safely with turkeys after they have been rough plucked, either by hand or by dry- or wet-plucking machines, and with considerable saving in labour. Wet plucking followed by wax stubbing was the quickest of the methods employed.

Retirement of Professor Thomas Wallace

Tom Wallace, as he is affectionately known to everyone, has retired after thirty-eight years' service in the University of Bristol. These years have been spent at the Long Ashton Research Station in capacities ranging from Lecturer in Agricultural Chemistry (in 1919), to Director of the Station and the National Fruit and Cider Institute (1943–7). But the effects of Professor Wallace's studies have reached far beyond the boundaries of Long Ashton—his authoritative work on mineral deficiencies in arable crops alone has benefited the whole farming community, and his many advisory visits overseas have done much to encourage fruitful interchange of knowledge between the workers there and those in the United Kingdom.

Professor Wallace played an active part in the post-war reorganization of the agricultural research advisory services; he is a member of the governing bodies of many of the research stations and horticultural colleges. His books on Mineral Deficiencies of Plants and on Fruit-growing are standard works.

Yet with all these claims upon his time and energy, Professor Wallace has always been unstinting in his attention to those seeking his help and advice. His retirement (but not absence, we hope) from the immediate fields of activity is bound to be keenly felt.

Month in the Forest

J. D. U. Ward

Caterpillars—Lammas shoots—Farmers' trees

The dull and tedious job of weeding and cleaning continues in young plantations and is usually the chief item in the August time-sheets. Where the first round of weeding has been completed by the beginning of June, the second round is usually due in August and the trees certainly benefit from this extra attention. But there are some circumstances in which little or nothing can be done to help them. For example, in many places one of this summer's unpleasant spectacles has been the half-naked oaks—trees over a hundred years old partially defoliated by caterpillars. There is a theory, which has found a place in two or three books, that the Roller-moth caterpillars do not attack the sessile oaks so badly as they do the pedunculate oaks. On that I can only comment, as a resident in sessile oak territory, "Then Heaven help the pedunculate oak people!" In fact, as owners of sessile oaks know only too well, the caterpillars often play havoc with their trees, and a walk through a sessile oak wood, perhaps in Herefordshire or Devon, may be frequently interrupted while caterpillars which have fallen down one's neck are retrieved.

There is almost nothing effective that can be done to relieve the afflicted trees, nor can the resident birds make much impression. It is only when flocks of birds such as starlings, jackdaws and rooks, or even the unexpected gulls, come in from other areas that a significant counter-attack is likely to be made. Incidentally, farmers and smallholders have occasionally been blamed, locally, for plagues of caterpillars on the oaks. There is, for instance, a theory that sheep straying in the Forest of Dean may encourage the multiplication of caterpillars because they browse-down so many of the bushes that provide nesting cover for the insect-eating birds which act as "police", keeping a useful eye on caterpillars when conditions are normal.

When trees are severely attacked by unusual numbers of caterpillars, the so-called Lammas shoots—the new leaves and new shoots which normally grow between July 10 and August 10—are of special importance. Obviously, the trees have been damaged, as this new growth will not make good the loss of timber increment, but it does at least improve their appearance and give them a better chance of recovering their vigour. Personally, I have a feeling that the term, Lammas shoot, is a trifle misleading. It suggests some special habit of growth about August 1 and gives an erroneous impression of tree rhythm. Tree growth is not so much continuous or steady through spring and summer, as proceeding in spurts interrupted by resting spells. And there is often an observable big spurt a fortnight after Midsummer's Day.

Sometimes the Lammas shoots may be longer than the spring shoots, but foresters tend to have some reservations about the value of these later

growths. Much depends on the subsequent winter. The Lammas shoots have not much time in which to mature or harden off before winter comes, and if the early winter brings sharp frosts, a forester may feel that his trees might as well not have made that late (and tender) growth. He would have preferred a little more growth back in May!

In this country, no other broad-leaved tree (with the possible exception of hazel) suffers quite such serious damage from defoliators as oak. It is interesting to note that poplars—the fastest-growing of all trees here—seem to be attacked relatively little. The other day I went to see again the quickest growing plot of trees in all Britain—hybrid poplars in Somerset which have averaged seven feet a year since 1950. Unfortunately, they can't be awarded top marks for canker-resistance, and the better known *Populus robusta* (which in ideal conditions may average about six feet a year) are the best that can be recommended.

The special difficulties of many farmers as owners of small woodlands are complicated by one basic consideration. A farmer's woodland is likely to be on soil which is good or much-above-average by the modest standards of British State forestry. This good soil would, broadly speaking, be suitable for growing broad-leaved trees either pure or in a mixture where broad-leaved species have the major place. But broad-leaved trees tend to be slower maturing (despite the obvious exceptions of poplar and ash) than conifers, and they also require not only more patience but greater experience and a surer judgment. (That is the kind of generalization that may evoke some murmurs of dissent!) Farmers may prefer a good, simple conifer that would yield fencing material.

In this connection it is perhaps worth making one comment on European larch, which is, on a good soil, a much superior tree to Japanese larch. European larch proved itself, for some three human generations, to be the most profitable tree planted in England for private estate owners. It is now under a shadow, and is particularly unpopular with some of the State foresters, mainly because seed from "wrong" sources was used on a big scale between 1880 and 1930. But European larch is still an extremely good tree, yielding much better timber than Japanese larch, provided you get seed or plants from "right" sources. This is a matter on which expert, disinterested advice should be sought before an order to buy is given, but Darnaway (Scotland), Sudeten and some Polish sources are satisfactory. Some other Scottish, Swiss and Italian are not suitable.

Two "quality" conifers with a high general utility, for fairly good, not too arid soils, are the western red cedar (*Thuya plicata*), from whose timber shingles are usually cut, and redwood (*Sequoia sempervirens*), the famous Californian species which can boast the tallest tree in the world (some 364 feet). But the redwood is not quite 100 per cent hardy and can be recommended only with reservation either north of Chester or east of a Bath-Southampton line—though some good specimen trees do exist, of course, outside the west and south-west.

Agricultural Statistics England and Wales

JUNE, 1956, AGRICULTURAL RETURNS (FINAL)

CROPS AND GRASS

(thousand acres)

DESCRIPTION	1939	1955	1956
Wheat	1,683	1,895	2,214
Barley	910	2,108	2,120
Oats	1,358	1,489	1,490
Mixed corn, for threshing (b)	83	456	410
Rye, for threshing	(c)	18	24
Total corn	**4,034**	**5,965**	**6,257**
Beans, for stock-feeding	133	86	105
Peas, for stock-feeding	37	21	19
Potatoes, first earlies	56	108	110
Potatoes, main crop and second earlies	398	495	525
Total potatoes	**454**	**603**	**635**
Turnips and swedes for stock-feeding	396(d)	288	252
Sugar beet (for sugar)	337	412	412
Fodder beet (all types of high dry matter content)	(c)	24	17
Mangolds	210	176	169
Rape	53	135	114
Cabbage, kale, savoys and kohl rabi, for stock-feeding	94	314	337
Vetches or tares	49	22	24
Mustard, for seed, fodder or ploughing in	48	40	32
Linseed, Flax, for fibre	4	2, 7	2
Hops	19	20	20
Orchards with crops, fallow, or grass below the trees	236	254	250
Orchards with small fruit below the trees	18	9	8
Small fruit, not under orchard trees	29	30	29
Vegetables for human consumption (excluding potatoes), hardy nursery stock, flowers and crops under glass	275	470	467
Fruit and vegetables, not grown primarily for sale	(c)	11	9
All other crops	48	38	44
Bare fallow	355	340	209
Total of crops and fallow (tillage)	**6,830**	**9,268**	**9,410**
Lucerne	32	103	102
Temporary grass (including clover and sainfoin):			
for mowing	1,304	2,352	2,203
for grazing	768	1,700	1,736
Total temporary grass	**2,072**	**4,053**	**3,940**
TOTAL ARABLE LAND	**8,935**	**13,423**	**13,452**
Permanent grass for mowing	4,612	2,919	2,966
Permanent grass for grazing	11,097	8,126	8,056
Total permanent grass	**15,709**	**11,045**	**11,022**
Arable and permanent grass temporarily out of use through flooding on the East Coast Jan./Feb. 1953	—	29	11
TOTAL ACREAGE OF CROPS AND GRASS (a)	**24,643**	**24,497**	**24,486**
Rough grazing:			
Sole right	4,179	3,729	3,658
Common rough grazing	1,361	1,479	1,479(e)
Total rough grazings	**5,541**	**5,208**	**5,137**

(a) Excludes rough grazings.
(b) In 1939 included areas cut green. In 1955 and 1956 these areas were included under "other crops"
(c) Not separately returned.
(d) Includes turnips and swedes for human consumption.
(e) Provisional.

SMALL FRUIT

(thousand acres)

DESCRIPTION	1939	1955	1956
Strawberries	18·7	17·7	16·7
Raspberries	4·1	3·2	2·8
Currants, black	10·4	10·4	10·4
Currants, red and white	2·3	0·9	0·9
Gooseberries	9·1	5·8	5·6
Loganberries and cultivated blackberries	2·5	1·1	1·2
Total small fruit	**47·2**	**39·2**	**37·6**

VEGETABLES FOR HUMAN CONSUMPTION, HARDY NURSERY STOCK, FLOWERS AND CROPS UNDER GLASS

(thousand acres)

DESCRIPTION	1939	1955	1956
Vegetables for human consumption (excluding potatoes) grown in the open			
Brussels sprouts	38·0	46·8	48·2
Remaining spring cabbage (planted in previous year)	44·1	10·5	8·2
Summer cabbage		9·1	9·6
Autumn cabbage		5·1	5·7
Winter cabbage		12·4	14·9
Autumn savoys		2·9	3·2
Winter savoys		9·2	10·9
Kale and sprouting broccoli		2·0	2·2
Winter cauliflower or broccoli (heading):	18·9		
Remaining from previous year's plantings		3·1	2·3
Planted in the current year		8·5	8·6
Summer and autumn cauliflower:			
Early summer sown under glass and planted in the open		5·2	5·6
Late summer and autumn (open sown)		7·4	8·7
Carrots, earlies (grown for bunching only)	16·1	2·6	2·9
Carrots, main crop		29·4	29·4
Parsnips	(a)	3·7	4·9
Turnips and swedes	(a)	4·6	5·4
Beetroot	(a)	8·1	9·4
Onions, grown for salad	1·7	1·2	1·5
Onions, for harvesting dry		3·7	4·3
Beans, broad	17·8	7·3	7·9
Beans, runner		8·6	9·8
Beans, dwarf or french		1·8	2·5
Peas, green for market	60·6	43·4	36·4
Peas, green for canning or quick freezing	28·0	46·9	48·0
Peas, for harvesting dry:			
Marrowfats		97·3	79·8
Blues		24·5	25·1
Aspagarus	2·6	1·4	1·4
Celery	6·7	4·6	4·6
Lettuce	5·9	6·7	7·8
Rhubarb	7·2	5·3	5·2
Tomatoes (growing in the open)	0·2	1·0	1·0
Other vegetables and mixed areas	(a)	14·6	18·7
Total	**247·7**	**438·8**	**433·8**
Hardy nursery stock:			
Fruit trees, fruit bushes and other fruit stock	10·5	3·6	3·9
Ornamental trees and shrubs		4·8	5·0
Other nursery stock (herbaceous plants, alpines, etc.)		3·9	3·9

DESCRIPTION	1939	1955	1956
Bulbs and flowers in the open:			
Bulbs grown for flowers:			
Daffodils (Narcissi)	7·7	3·2	3·5
Tulips		1·5	1·6
Other bulb flowers		0·7	0·7
Bulbs grown for sale as bulbs:			
Daffodils (Narcissi)		1·2	1·3
Tulips		1·2	1·3
Other bulbs		0·2	0·2
Other flowers, not under glass	5·8	6·5	6·7
Total	**13·5**	**14·5**	**15·4**
All crops grown under glass	**3·3**	**4·4**	**4·4**

(a) Not returned.

LIVESTOCK

(thousands)

DESCRIPTION		1939	1955	1956
Cows and heifers in milk:				
For producing milk or calves for the dairy herd		2,255	2,064	2,090
Mainly for rearing calves for beef			415	454
Cows in calf but not in milk:				
Intended for producing milk or calves for the dairy herd		392	351	361
Intended mainly for rearing calves for beef			83	86
Heifers in calf (first calf)		459	630	696
Bulls being used for service		91	66	64
Bulls (inc. bull calves) being reared for service		43	25	26
Other cattle:				
2 years old and over	Male (Steers)	(a)	531	561
	Female	(a)	600	563
	Total	**944**	**1,131**	**1,124**
1 year old and under 2	Male (Steers)	(a)	559	583
	Female	(a)	1,044	1,047
	Total	**1,346**	**1,603**	**1,630**
Under 1 year old (excluding bull calves being reared for service)	Male (Steers)	(a)	608	634
	Female	(a)	1,064	1,089
	Total	**1,242**	**1,671**	**1,723**
TOTAL CATTLE AND CALVES		**6,770**	**8,039**	**8,253**
Number of calvings Calvings which occurred during the three months preceding date of census				
Heifers that calved for the first time during March, April and May		(b)	171	174
Cows and other heifers that calved during March, April and May			535	587
TOTAL CALVINGS			**706**	**761**
Sheep one year old and over:				
Ewes kept for breeding		7,160	5,703	6,020
Two-tooth (shearling) ewes or gimmers		1,477	1,347	1,338
Rams kept for service		205	158	163
Other sheep one year old and over		1,021	1,082	762
Total one year old and over		**9,863**	**8,291**	**8,284**
Sheep under one year old:				
Ram lambs intended for service		156	66	70
Other sheep and lambs		7,967	6,386	6,843
Total under one year old		**8,123**	**6,452**	**6,913**
TOTAL SHEEP AND LAMBS		**17,986**	**14,743**	**15,197**

Description	1939	1955	1956
Sows in pig	(a)	306	293
Gilts in pig	(a)	77	112
Other sows kept for breeding	(a)	183	160
Total sows for breeding	**449**	**566**	**565**
Barren sows for fattening	(c)	(c)	15
Boars being used for service	30	36	35
All other pigs (not entered above):			
5 months old and over	633(c)	892(c)	827
2–5 months old	1,516	1,993	1,836
Under 2 months old	888	1,192	1,112
Total all other pigs	**3,036**	**4,076**	**3,775**
TOTAL PIGS	**3,515**	**4,677**	**4,389**
Fowls 6 months old and over	23,154	27,390	28,603
Fowls under 6 months old:			
Male, Female	(a)	4,773, 29,114	5,173, 32,066
Sex not known		2,723	2,606
Total fowls under 6 months old (d)	**29,758**	**36,610**	**39,845**
TOTAL FOWLS	**52,912**	**64,001**	**68,448**
Ducks of all ages	2,237	1,003	984
Geese of all ages	584	452	452
Turkeys of all ages	693	1,200	1,881
TOTAL POULTRY	**56,426(e)**	**66,656**	**71,766**

(a) Not collected separately. (b) Not returned.
(c) Barren sows for fattening were not collected separately in 1939 and 1955 but were included among other pigs, 5 months old and over.
(d) The division into sexes in 1955 and 1956 may have affected comparability with the 1939 figures.
(e) As a result of war-time controls many small-sized holdings were recorded for the first time in 1941. It is estimated that to make the totals prior to 1941 reasonably comparable with later years some 3 or 4 million birds should be added in England and Wales.

Description	1939	1955	1956
Horses (including mares kept for breeding) used for agricultural purposes or by market gardeners	549	134	105
All other horses and ponies (not entered above)	297	100	98
TOTAL HORSES	**846**	**235**	**203**

Description	December 1951	June 1954	June 1956
Milch goats (goats in kid or in milk)	16	12	11
All other goats	10	10	9
TOTAL GOATS	**27**	**23**	**21**

LABOUR

(thousands)

FOR 1939 AND 1955 REFERENCES TO AGE SHOULD BE READ AS AGE 21

Description	1939	1955(a)	1956(a)
Regular wholetime workers:			
Male, 65 years old and over	375·3	22·3	20·6
„ 20 years old and under 65		343·6	334·9
„ 18 years old and under 20	44·7	33·2	26·0
„ under 18 years old	50·8	39·7	36·1
Total male	**470·8**	**438·8**	**417·6**
Women and girls	40·3	39·8	37·2
Total male and female	**511·1**	**478·7**	**454·7**

Description	1939	1955(a)	1956(a)
Regular part-time workers:			
Male, 20 years old and over	(b)	43·1	40·6
„ under 20 years old		5·4	4·4
Total male		**48·5**	**45·0**
Women and girls		30·7	30·1
Total male and female		**79·2**	**75·1**
Seasonal and temporary workers:			
Male, 20 years old and over	(b)	44·3	42·7
„ under 20 years old		4·5	4·0
Total male		**48·8**	**46·7**
Women and girls		32·0	33·1
Total male and female		**80·7**	**79·8**
Casual workers:			
Male, 20 years old and over	57·4	(b)	(b)
„ under 20 years old	5·9		
Total male	**63·3**		
Women and girls	32·7		
Total male and female	**96·0**		
Total male workers	**534·1**	**536·0**	**509·2**
Total female workers	**73·0**	**102·5**	**100·4**
TOTAL WORKERS	**607·1**	**638·6**	**609·6**

(a) Revised and more comprehensive instructions on the labour section of the form introduced for the first time in September, 1948 resulted in the return of additional workers, the figures for June, 1955 and June, 1956 are not, therefore, comparable with those for 1939.
(b) Not collected separately.

CROPS GROWN IN GLASSHOUSES (a) (January 1957)

	Jan. 1956	Jan. 1957
	acres	*acres*
Total Area of Glasshouses		
With heating apparatus	3,824	3,779
Without heating apparatus	747	779
Total	**4,571**	**4,558**
Crops in Glasshouses at January 15		
Lettuce	529	545
French beans	3	2
Mushrooms	31	39
Other vegetables and herbs	64	128
Carnations	174	176
Roses	114	123
Orchids	10	10
Bulbs for forcing	167	182
All other flower and foliage crops	471	468
All other crops not specified above	329	258
Total	**1,892**	**1,931**
Remaining glasshouse area (being the area unused at January 15 or used for other purposes not shown above	2,679	2,627
Total area of glasshouses	**4,571**	**4,558**
Chrysanthemums in Glasshouses		
Area of chrysanthemums grown in autumn and winter	773	829
Lettuce in Glasshouses		
Area of lettuce completely cleared before January 15	71	72
Area of lettuce as at January 15	529	545
Area of lettuce to be planted between January 16 and March 31	388	379
Bulb Flowers in Glasshouses		
Total number of flower bulbs forced, or to be forced, under glass during the winter season	(b)	219,527,000

(a) Includes Dutch light structures which were glazed at the census date. Holdings included in this census are those with 1,000 square feet or more of glass.
(b) Not collected in1956.

Farming Affairs

Talking about poultry

The coming harvest will be important to both large and small poultry-keepers. Large concerns will probably try to buy and store as much grain from harvest as they can afford; both will be interested in straw for litter. In the past the industry has used a great deal of shavings for litter, but the price has risen with the demand. In my opinion, chopped straw, especially that which has been through the combine, makes a most satisfactory and economical litter. We shall be using half wheat and half barley straw this year, first putting it through a chopper-blower machine of the silorator type. A machine is essential in our case, since we have to handle such very large quantities. This machine takes a bale of straw every 20 seconds, and the difficulty therefore is to keep up with the machine and make use of its continuous running. As an alternative, my colleague at Harrogate has mounted his cutter-blower on a three-point linkage on the back of a tractor and blows in the chopped straw direct through the house windows.

It is well worth trying to buy straw while the harvest is on, and it is quite practicable to make a flat-topped stack, cover it with either sheets of tin, asbestos or tarred paper and hold the covering down with a layer of bales on top.

The other annual poultry operation is of course "stubbles". Frankly, I never recommend it because nearly everyone over-estimates the amount of feed there is available, and in my opinion it is a very dangerous practice with a flock of pullets which are expected to come into production in a few weeks. Probably the best use for stubble is for store cockerels or turkeys which will have a month or two to recover if they do run short of food and get out of condition. I don't suggest there is any likelihood of heavy mortality, but rather that the birds can so easily lose condition. If, however, this job is attempted, then two things should be remembered. Firstly, that the birds will only wander so far from their houses and it is therefore necessary to move the houses over a large field, and secondly, that someone should handle a few birds last thing at night and just check that they have some feed in their crops. In other words, make your estimate by all means, but do check it and make sure that the birds are getting their feed.

A word about winter lighting of layers. I find that this operation is often started much too late in the year. In fact, we have lost nearly two hours of daylight by the end of August, and while we ourselves may not notice this, the layers certainly do, especially where they are kept intensively. I feel strongly that winter lighting should start on September 1st as a general guide, but where you are dealing with early-hatched January pullets, then some light, an extra hour or two a day, should be started from the second week in August. I suggest beginning with an hour and working up to two hours by the end of the month. We all know that the January-hatched bird can make a most valuable contribution towards a constant egg output over the year,

and we also know that she is very susceptible to neck moulting in the autumn. I am quite sure that if the lights are used in the manner outlined above, the risk of a neck moult can be pretty well eliminated and the birds carried right through the winter without any drop in production. C. T. Riley

Farm first aid

On 1st August regulations came into force making it compulsory for first-aid equipment to be provided on all agricultural holdings where workers are employed. Prevention is undoubtedly better than cure, and discussions about preventive measures are now going on between the various interests concerned. But drafting and passing laws to counter the chief dangers to farm workers will inevitably take time. Recognizing this, the Government have given priority to regulations designed to limit the effect of injuries. Section 6 of the Agriculture (Safety, Health and Welfare Provisions) Act, passed in 1956, requires first-aid boxes to be provided for farm workers by their employers. The first of the new Statutory Instruments prescribe what these boxes must contain and the numbers required according to the number of workers employed.

There are two sizes of box—"small" and "large". In addition, the regulations provide for a "container" which is, in effect, a large box used as a mobile addition to cover larger numbers of workers. The boxes and the containers must be conspicuously marked "First Aid" and placed where workers can easily get at them. The contents have been chosen on the latest medical advice and are very simple. The cost, whether the materials are bought separately or as a complete kit, should not be high.

Briefly, the regulations prescribe that on each holding where the employer has from 1 to 3 workers he must provide the small box. On each holding with from 4 to 10 workers, he must have the large one. If the number of workers exceeds 10, the employer must also provide a container (in effect, another large box), and the two together will be enough for up to 40 workers. Two containers and the large box will provide for 41 to 70, and three containers plus the large box will be enough for any number of workers over 70. No more than three containers have to be available on any holding which has a box, no matter how many workers are employed.

A contractor doing work on a farm must similarly provide first-aid boxes for his own men, whether or not his men are working on a farm where equipment has already been provided for "resident" workers.

A leaflet giving simple advice on the treatment of injuries is included by the manufacturers of all ready-made first-aid kits. Additional copies can be obtained free from any of the Ministry's local offices or from the Ministry's Publications Branch, Soho Square, London, W.1, from the Department of Agriculture for Scotland, Broomhouse Drive, Edinburgh, 11, or from the National Farmers' Unions.

Both the St. John and the Red Cross organizations provide training in first aid, either by a brief course conducted by a doctor, leading to a test and a certificate, or an even simpler series of lectures and practice. Given the demand, the organizations will, in any part of the country, provide the training at a small cost. Interested readers can get the addresses of local officers of the first-aid associations from the county branch of the National Farmers' Union or the National Union of Agricultural Workers.

Tractor sense

In preparing for harvest and making sure that the combine, grain drier and the elevators are all in order, it is sometimes forgotten that the farm's tractors also play an essential part in harvesting operations. In a way this forgetfulness is a tribute to the reliability of the tractors and to the fact that it is so easy to get spares and repairs for them in an emergency, but all the same, breakdowns can cause hold-ups that affect the whole harvest, and it is well during the next week or two to give some special thought to tractors.

If a tractor is to be used for driving the ventilating fan of an in-silo drying installation, its engine should be tuned up a little. It is often said that driving the fan and providing waste engine-heat to warm the ventilating air is a job for an old, worn-out tractor, and that if the tractor breaks down, it is better to replace it by another old one than to overhaul it. In a bad drying season, or in an installation dealing with several crops, the engine may have to run for as much as 800 hours before all the grain is dried. This is as long as many tractors work through the whole year, and driving a large ventilating fan is usually quite a heavy load. A tractor on this work therefore merits some attention for its engine, particularly when it is remembered that if the tractor engine fails during an all-night run, a lot of drying time can be lost. It is true that during the night hours the rate of drying is generally not as high as in the day, because the air is damper, but it is a pity to lose any drying period at all.

See that the driving belt is in good order and has a sound fastener. If an old shiny belt is used, or one that is too narrow to transmit the power easily, much time can be spent in efforts to restore the grip by moving the tractor back to tighten the belt, or in treating the face of the belt with grip compounds.

If tipping trailers are used to discharge into the grain pit at the drying installation, check over the flexible hydraulic hose and the other parts of the tipping mechanism in time for replacements to be bought if necessary.

The bodies of the trailers for carrying grain in bulk may have warped during the year or, if they are metal-lined, the metal sheet may be torn. Look them over carefully and fill any openings which are large enough to allow grain to trickle away.

Tyres used on fields last so long and give so little trouble that they are rarely accorded special inspection, but an hour or two spent in these pre-harvest days in looking after tyres will be well worth while. When the rear tyres on tractors have their treads worn down too far for them to grip well for ploughing, they can still sometimes be used satisfactorily for summer work such as harvesting where demands for traction are smaller, and provided the tyres are at the right air pressure and reasonably free from flints. Worn tyres are always more susceptible to damage than those with new treads. Remove flints where possible and mend any slow punctures that may have been allowed to go unrepaired. Make sure that a puncture repair outfit or a vulcanizing set will be available during the rush hours of harvest, and also that jacks and tyre levers and a good air pump are kept ready at some place known to all concerned.

H. J. Hine

In Brief

THE LION AND THE EGG

From July 1st, the British Egg Marketing Board took over from the Government the responsibility for regular trading in eggs. Over 400,000 registered producers, supplying more than 18 million boxes of eggs a year through some 640 packing stations, will now look to the Board to promote the sale of home-produced eggs as a high-quality product upon which the consumer can confidently rely. The Government's guarantee under the Agriculture Act is now to the Board instead of, as previously, direct to the producers. The Ministry is thus no longer responsible for fixing the weekly minimum prices paid to individual producers. The egg packing stations will go on collecting eggs from producers as before, but they will be acting as agents of the Egg Marketing Board, who will themselves buy all hen eggs sold through packing stations. The Ministry will pay the Board a flat rate of subsidy on all first-quality eggs so bought. It will be for the Board to decide what prices it pays to producers, subject to the provisions of a financial agreement. This agreement will also provide for a risk-sharing arrangement between the Government and the Board designed to give the Board an incentive to get the best out of the market.

The Board's three-point programme is to sell more eggs, to get them from farm to kitchen quicker, and to encourage high quality production. It has created its own stamp, with a British lion on it—a hall-mark for producer, packer and housewife alike. Long-term, planned advertising, based on market research, has already begun with the aim of building up sales. The present average consumption of eggs in the United Kingdom is 4 per person per week, so that there is plenty of scope for increase.

The Chairman of the Board is Mr. W. J. Welford, the well-known Oxfordshire farmer, and the General Secretary of the Board is Mr. A. H. R. Sellar, A.C.A., and the address of the headquarters offices is Mercury House, Waterloo Road, London, S.E.1.

GRASS SENSE

Ten years ago, Mr. H. G. Taylor's Blakenhall Farm at Barton-under-Needwood, Staffs, subsisted under a complicated system of arable cropping and a lot of old turf. Today, simplified cropping—82 acres of wheat and 8 acres of kale—and good management of 160 acres of grass leys have put the farm on a sound economic basis. A dairy herd of 60 cows and 45 followers is kept, and the farm is divided into blocks of 50 acres, each worked in a five-course rotation (usually a three-year ley followed by two corn crops).

Silage is made from the surplus spring crop in a Dutch barn which has been adapted so that the cows feed themselves. By thus saving labour, the cost of feeding has been cut by 4*d*. for every gallon of milk, and since 21,000 gallons are produced in the winter months, the saving is considerable.

The cardinal points of Mr. Taylor's policy are briefly: the plough perambulates the farm; fertilizer is used generously (two heavy applications equal to 6–8 cwt sulphate of ammonia are given before the end of May—this gives two large and leafy crops, and most of the silage is made before the middle of July); good management for early bite; maiden seeds for midsummer grazing; strip grazing with an electric fence; and alternate cutting and grazing where possible.

By ensuring a succession of leafy crops in the spring, more silage has been pro-

duced and within a year has cut the bill for concentrates by 1·9 lb per gallon of milk without any loss in yield per cow.

At a demonstration and conference organized by I.C.I. at Blakenhall Farm on July 11th, over 700 visitors saw for themselves what grass sense can do.

CHAROLLAIS CATTLE FOR CANADA

The introduction of Charollais cattle from Texas into Canada for crossing is reported in *The Scottish Farmer*. The breed apparently appeals to meat producers and packers in the Dominion because it is claimed for it that the daily rate of gain is higher than that of the other breeds, the dressing-out percentage is high (62–68 per cent) and the meat well marbled without a thick layer of fat. It is said that one or two A.I. centres in Ontario are planning to have frozen Charollais semen available for use this year.

This French breed of white cattle takes its name from the small town of Charolles in the Department of Saône et Loire and were originally kept mainly as beasts of burden. At the Texas Agricultural Experimental Station, U.S. Charollais and cross-breds, especially the Charbras (Charollais × Brahma) have proved outstanding in weaning weight, liveweight increase and final weight. The Charollais was the subject of a short article by J. Worthington in the June 1956 issue of *Agriculture*.

CIDER ORCHARDS

Returns for the sale of cider apples have rarely been very high. Before the war £4 a ton was the price, but now it is about £12–£13 a ton, delivered to the factory. It varies, of course, from year to year. Many orchards will not yield above 1–2 tons of fruit an acre, but an average of 5–6 tons an acre per year should be harvested from fully bearing orchards made up of the better cropping varieties. How long an orchard takes to reach its full cropping capacity depends largely upon the treatment the farmer gives it in the first five years. It used to be said that the period before cropping was 25 years, but if the farmer makes full use of modern methods of orchard management, the orchard should be producing sufficient apples to pick up in six to seven years, and a very useful crop at 12 years, rising to near maximum by 20 years. After this, the orchard may well have a useful life of 30–40 or even 50 years, depending upon how well it is looked after.

On this basis, the sales of fruit alone may not justify planting the trees. True, the capital expenditure in planting an orchard in Hereford is not large, say 8*s*. 6*d*.–10*s*. 6*d*. for the tree and 6*s*. for a good stake, wire netting guard and a length of barbed wire, with an additional charge of 3*s*. a tree for setting out the orchard and for planting and staking. It is customary to plant 30–40 trees to the acre and, at 35 trees per acre, the cost would be about £31–£35 an acre. Because of the low returns, the threefold practice has developed of cash sales of fruit, grazing for sheep and cattle, and shelter for cattle from heat and cold and for lambing in the spring. To this may well be added the " uncostable " item known as "convenience" when the orchard also serves as a home orchard near the farm buildings and is put to many uses.

N.A.A.S. Quarterly Review

LANDRACE AND LARGE WHITES ON THE HOOK

Fifty-four entries of pig carcasses came before the judges at this year's Bath and West Show for the Sidmouth Trophy. It is interesting to note that 40 of these were either pure Landrace or pure Large Whites (22 and 18 respectively) and of the others all but one were Landrace or L.W. cross. The first four places were secured by Landrace, the fifth by Large White. Eight carcasses scored 80 points or over—

6 pure Landrace and 2 pure Large Whites. The average points scored by all 22 Landrace was 74·8, and by the Large Whites 70·4.

"Length for Weight" markings (max. 15 points) gave an average of 10·3 points to the Landrace and 8 points to the Large Whites. "Proportion of lean to fat" markings were: Landrace 13·3 and Large Whites 13·4 (max. 20 points).

Viscount Sidmouth

NORWAY'S DAIRY FARMS

Of Norway's 204,000 dairy farms, 95 per cent have ten cows or less, 4 per cent between ten and twenty cows, and less than ½ per cent between twenty and fifty cows. Only 35 farms run more than fifty cows. Basically, the method is to keep the cattle tethered in cowsheds, and only for a third of the year are they out for grazing. Mobile outdoor bails with single or multiple row standings are on the increase. The animals stand mainly head to head, and combined sheds are used for cows, calves and other types of stock.

Three-storey buildings are used; the first storey, a manure pit (under the stalls), the second the cowshed proper, and the third the hay loft. Manure is carted once a year (in February or March) and the mucking-out takes 2½ minutes per cow, per day.

During the winter, manure may be taken out on horse-drawn sledges and heaped in the fields for spreading and ploughing in the spring, but the Swiss Gülle method, where manure is mixed with water and distributed over the fields through pipes, is now being tried out on a few farms.

Fodder grain is milled, straw is processed with caustic soda, and roots are cleaned and chopped. Usually all fodder is distributed by hand (five minutes per cow per day), but some large farms have installed surface or overhead rail systems.

GOOD SHOOTING

The I.C.I.'s free 8-page leaflet, *Come and Shoot Woodpigeons* can be unreservedly recommended to all who have an interest in "the poor man's sport". What should and what should not be done are equally stressed, and good advice is briefly given on clothes and camouflage, organized drives, hides and the setting of decoys. Write to I.C.I. Game Research Station, Fordingbridge, Hants.

FIRST ATTEMPT WINS AT THE HIGHLAND

The only Englishman to exhibit in the fat cattle section of the Royal Highland Show MR. T. MANN of Crooklands, Wigton, Cumberland, won the supreme championship at his first attempt. Moreover, he showed only one animal—an outstanding pure-bred Aberdeen-Angus steer "Matha", bred by Mr. Matthew Templeton at Charterhouse, Kelso. The steer, born in May 1955, sired by Newhouse Edwin Erison and out of a dam by Jeffy Eric, took third place at the Edinburgh and Smithfield Fatstock shows last year. He will be going to these shows again this year. At Smithfield, he was one of the team which won the Duke of Norfolk Trophy.

CHARTWELL JERSEYS SOLD

Sir Winston Churchill's herd of 53 pedigree attested Jerseys was sold by auction for £3,750 at his Chartwell farm on June 18th, averaging a price of approximately 94 guineas a head. The highest price was 300 guineas for the gold-medallist, seven-year-old cow Cobhambury Idaho, who has two 1,500 gallon yields to her credit.

Book Reviews

The Diagnosis of Mineral Deficiencies in Plants by Visual Symptoms: A Colour Atlas and Guide (2nd Impression of 2nd Edition). T. WALLACE. H.M. Stationery Office. 60*s*. (61*s*. 3*d*. by post).

Of the various reasons for crops yielding less than they might, underfeeding or an unbalanced diet is one of the commonest. Often such troubles are easily put right, and as their correction can show handsome profits, the importance of their diagnosis is obvious. Professor Wallace's *Colour Atlas and Guide* provides the necessary information simply and clearly and, as it is the only British publication that does so, it is a pleasure to welcome a new impression of it after a period when it has been out of print.

The bulk of the book consists of 312 colour photographs from which, even if the precise sign of any specific deficiency is not always immediately clear, there is, in total, ample evidence of what to look for as hunger signs. The plates are grouped by crops, and for each crop the effects of individual deficiencies are given in the same order, starting with nitrogen and ending with molybdenum, except for apples, which end with zinc. Most of the photographs are good, and it is a pity that the occasion of a new impression was not taken to replace the few poor ones so that all reach the same high standard. No. 241, for example, which is little more than a photograph of a pot lying on its side, might almost as well have been omitted, except that it indicates that lettuce does not grow unless supplied with nitrogen.

The text consists of five chapters: (1) Essential Points in the Nutrition of Plants; (2) Soils in Relation to the Supply of Mineral Nutrients; (3) Methods of Determining Mineral Deficiencies in Crops; (4) Visual Symptoms of Deficiencies in Crops; and (5) Use of the Visual Method of Diagnosis in the Field. It is written simply, as befits its prime purpose, which is "for the use of technical officers and advisers . . . and for progressive farmers, vegetable growers and fruit growers", and is even more necessary for its secondary aim of being useful to "the large body of the general public who are interested in gardening".

Presumably, the details of other methods than visual inspection for determining mineral deficiencies are included for the benefit of technical officers and advisers, but probably few even of these will have the opportunities to lay out the suggested test plots of indicator plants with various fertilizers. However, no doubt it is all to the good that such things are included, for without them readers might overlook the fact, which Professor Wallace repeatedly and rightly stresses, that visible signs alone are often not enough to diagnose a nutritional deficiency and that such signs need confirming by more specific tests. The great value of the book is that it makes the reader "nutrition conscious", so that inevitably he will look at his crops more critically for hunger signs.

F.C.B.

Poultry Breeding Management. J. AMSDEN and K. W. BRANDON. Crosby Lockwood. 15*s*.

Some degree of courage is required to prepare a book on the subject of poultry breeding, more particularly when it is intended for the guidance of the small breeder. At present, there is general recognition of the limitations of mass selection and of conventional family breeding in raising flock averages beyond a hen-housed value of 200 to 210 eggs. The newer techniques of hybridization, designed to break through this barrier, involve either capital resources beyond the means of the individual farmer, or the simpler but as yet unproved method of reciprocal recurrent selection.

The authors rightly avoid prescribing a blue-print for poultry breeding. They describe, quite simply and in a straightforward manner, their own and other systems of breeding, and the reader is left to make his choice.

The twelve chapters cover the origin and classification of fowls, the genetical basis of breeding, the inheritance of economic characters, selection methods, mating systems and breeding programmes. Although morphological features are used to illustrate simple mechanisms of inheritance, including the inevitable description of crosses involving tall and dwarf peas,

the emphasis is on those characters directly affecting the profitability of poultry-keeping.

The provisions of the Government's new poultry progeny testing scheme are included as an appendix to the book. The index is adequate and a glossary of technical terms is accurate and helpful. The publishers are to be congratulated on the attractive presentation and clear print.

This work will commend itself mainly to beginners in poultry breeding and to students of farm institutes. It is likely to stimulate them to proceed to more profound works on this subject.

H.T.

Pembrokeshire. (Regional Books Series). R. M. LOCKLEY. Hale. 18*s*.

Pembroke is one of the few counties which is still largely unspoilt by industrial developments, but several projects are in hand and may soon transform large parts of this very rural area. At present it is undoubtedly a county of considerable interest to the historian and naturalist.

In the opening chapters of his book, Mr. Lockley briefly, but very skilfully, traces the history of the county. A series of invasions extending over many centuries and emanating from various parts of Europe has had a considerable influence on place names, people, and the language. The Romans, Vikings, Normans, Flemings, Irish, and others, have left their marks on this "Little England beyond Wales", and well the author tells the story in prose and picture while pointing out the landmarks that remain. Castles, palaces, and St. David's cathedral, the shrine of the Patron Saint of Wales, receive special mention.

It is generally agreed that the coastal belt is one of the most beautiful in the country. Fortunately, it has been designated a National Park and thus the preservation of its beauty is ensured. Off the coast lie several islands, notably Skomer, Stokholm and Grassholm—the great breeding grounds for sea birds. Grassholm, in fact, appears to be the only stable large gannetry in England and Wales. Owing to the county's great diversity of natural features and its position in the path of the great spring and autumn migrations, the number of species of birds recorded—some 300—exceeds that of any other county in Wales.

The author also deals with important aspects of the agricultural industry. A combination of a deep and fertile soil in the southern parts, an equable climate, an adequate rainfall and, generally, an absence of frost, has successfully encouraged an expansion of horticulture and, more recently, flower culture. Pembrokeshire is shown to be a county of undoubted agricultural opportunity as well as of general interest.

W.H.J.

Farm Mechanization Handbook (3rd Edition). T. HAMMOND CRADOCK. Temple Press. 25*s*.

The amount of machinery in use on British farms shows no signs of diminishing, and the cost of maintaining it in good repair often forms a formidable item on the debit side of farm profit and loss accounts.

This latest and enlarged edition of Mr. Hammond Cradock's book presents, in a very readable form, an impressive collection of information which will give the student of agricultural machinery a sound knowledge of the operation and care of many of the more important farm machines. Farmers and farm workers who use these machines in the field will not only learn how to diagnose and deal with faults as they arise, but, perhaps more important, how to delay or prevent their occurrence.

The author has, very rightly, left much of the basic material on engine fault diagnoses and rectification unchanged, but a valuable new chapter on "Electricity and the Tractor" and a section on decarbonizing techniques for four popular tractors have been added.

Buying a used tractor is a risky business, and a new chapter on the subject spotlights the minor faults which may be tolerated and shows how and where to look for deep-seated troubles.

The plough, mower, binder, combine harvester and baler are covered in a very practical way and some of the accompanying diagrams are particularly helpful. Dr. Sandor's pulley selection chart and a chapter on buckrake setting are worthwhile additions to this well-indexed book which is a thoroughly sound and authoritative guide to the better understanding and care of farm machines.

D.E.W.

Milk and Butterfat Recording: A World Survey. E. D. ASHTON. Commonwealth Agricultural Bureaux. 30*s*.

Twenty-one years have elapsed since the International Institute of Agriculture published a survey of milk and butterfat recording. During that time much progress has been made not only in the numbers of herds recorded in the countries which then had schemes running, but, also, in the number of countries where milk recording has been introduced.

A factual description of the scheme or schemes in each country would have made dull and rather profitless reading, but Mr. Ashton devotes the first 59 pages of his book to a broad discussion of the milk and butterfat recording movement, including its origin and development. He recognizes that there are now two types of schemes: one provides the basis for the selection for sale of breeding stock, and requires records which have been subject to independent official supervision, and the other is an essential element of good dairy-herd management in that it gives the herd owner precise information on which to base his feeding according to yield, the culling of his herd, and the selection of sires.

In many countries where recording has become well established, the number of herds is fully adequate for the purpose of bull selection even though it may represent only 10 per cent of the milking stock in the country. The unofficial recording schemes have no such limitations; their target is 100 per cent. A further important distinction between the two types of schemes is that official records are so costly to authenticate that the schemes providing them require some outside source of financial support. Unofficial or "private" recording schemes are much less costly and, but for their promotion expenses, could almost be self-supporting. Organized milk and butterfat recording has always required some sponsoring. This has usually been provided by Breed Societies, but Governments have also played a large part in financing the establishment of schemes initiated by the dairy farmers themselves.

There is some danger that the lure of herd averages, which tend to become a feature of official schemes, may induce a competitive element between herd owners, concealing, to some extent, the real purpose of recording, which is the selection of individual animals.

The first part of the book promotes a more perceptive appraisal of the second part. In this, details are given of the milk recording schemes in each country from which information is available. Countries are divided into five groups according to the type and growth of organization. The Netherlands might, I think, have been more appropriately grouped with the northern European countries.

Copies of this book are obtainable through any major bookseller or direct from the Commonwealth Agricultural Bureaux, Farnham Royal, Bucks.

K.H.B.

Pigs: Their Breeding, Feeding and Management (6th Edition). V. C. FISHWICK (Edited by W. ANDREW BIGGAR). Crosby Lockwood. 20*s*.

As a popular text-book on pig farming, this work is excellent. Careful observation, well recorded, forms the basis of the original book, and this has been the reason for its success in the past.

Pig farming is in the midst of great changes today, and a new book on the subject is bound to be controversial and quickly out of date in some details. For example, many would not agree that castration cannot be carried out at under four weeks of age; in the paragraph on virus pneumonia, coughing is over-rated as a reliable diagnostic symptom, and one is led to believe in tests for freedom from V.P.P. that are inadequate.

If the reader is looking for an up-to-minute book on the fringe of present-day knowledge of pig management, he will be disappointed. The frequent references made in this edition to "war-time rations", "pre-war" and "war-time grading" could well be omitted in the next, and the space used for more than passing reference to such urgent problems of modern pig farming as ventilation, effect of temperature on conversion ratio, replacement of middlings by whole wheat, early weaning, individual sow feeding, antibiotics and mechanical muck handling.

Throughout the book, interest is increased by reference to experimental evidence, but in one or two cases there seems doubt as to whether conclusions are not too easily drawn from insufficient replicates of the trial—whether all the results are really significant. There is scope for much work on the sorting out of experi-

mental evidence and conflicting practice in pig farming, and a reviewer must not be carried away by his enthusiasm and expect to get it all in a single volume!

The chapter on housing is authoritative and the plans at the end bear careful study; they show what is good in principle in modern pig building design.

The revision of a book of this nature is no straightforward task, and Mr. Biggar has worked under the difficulty of taking a book from Wye and revising it, so to speak, out of its context. He has erred, no doubt purposely, on the side of preserving the original book rather than introducing much new experience of his own. The result is readable and instructive.

N.S.

Rural Depopulation in England and Wales, 1851-1951. (Dartington Hall Studies in Rural Sociology). JOHN SAVILLE. Routledge and Kegan Paul. 28*s*.

Rural depopulation has always been a subject discussed with more emotion than fact. It is a bottomless pit for those who approach it with preconceived ideas or are easily baffled by conflicting points of view and the vagaries and complexities of population census material. It is valuable, therefore, to find a book where a good historian, conscious of his lack of any special knowledge of rural or agricultural problems, has carefully delved into the facts and opinions on the almost continual flow of people from countryside to town in this and all other developing countries.

The author discusses the problem in general and national terms before giving a description of an area in south Devon where the problem looms large. Obviously, studying a local area has helped his handling of rural population problems in general, but no one can accuse him of being prejudiced by the peculiar circumstances of the south Devon area. He has protected himself from such an accusation by carefully studying historical, census and library material on the facts and interpretations of rural migration over Great Britain as a whole and in many other countries.

In his introduction Mr. Saville makes a plea for the development of the study of rural sociology in this country. He emphasizes the need for investigation into the subject as a whole as well as into such individual facets as agricultural capital improvements, Young Farmers' Clubs, and provision of rural housing. The countryside of Britain is changing quickly. Changes in the basic ways and economy of farming and in the mobility of people, goods and services, are likely to produce a new pattern of human settlement in rural areas. By studying the present trends it should be possible to guide them into socially acceptable channels.

Many will want to buy this book for the factual information it contains of British rural history over the past 100 years. Others will also value the range and comprehensiveness of the written information which the author has studied and recorded in his numerous footnotes.

G.P.W.

The Lily Year Book, 1957.
The Daffodil and Tulip Year Book, 1957. Royal Horticultural Society. 10*s*. each (11*s*. by post).

Once again the Royal Horticultural Society has produced its "annuals" for the lily-lovers and the devotées of daffodils and tulips. As gardening becomes more widespread, so specialization increases, and this is all to the good. It is comforting, however, to the layman to find even the specialists are offered an article on "One Dozen Trouble-proof Lilies".

In the various year books which the Society publishes, the editor has lately produced a "gimmick"; he gets several people to list their favourite species or varieties. In the *Lily Year Book*, three writers name and describe their five favourite lilies. With the exception of *Lilium auratum*, which two of the writers choose, no two species or varieties appear in any of the lists, so it is obvious that tastes vary considerably.

There are articles on lilies from every part of the world, reports of lily group meetings, hints on raising these flowers from seed, and even an article on "Lilies for the Rock Garden"—a real feast for the lily fan!

But there is very little in the *Daffodil and Tulip Year Book* for those concerned specifically with tulips—just one article on "Tulips for Home Decoration". This is surprising, because there are so many beautiful tulips to write about, and so many developments going on with this genus. Maybe the daffodil enthusiasts are

more prone to leap into print! Certainly, the daffodil growers are getting value for money in their particular year book—that is, if they are sufficiently enthusiastic to wish to read articles about daffodils in Holland, Ireland, Lincolnshire, America, Australia and New Zealand. There are articles on raising daffodils, and notes on growing them in pots, but after that the book is filled mainly with descriptions of shows, competitions, awards for daffodils, and such domestic matters as can be of interest only to the devoted specialist. Is there really sufficient new material about the daffodil each year to warrant an annual publication? On the other hand, if the Royal Horticultural Society did not shoulder the burden of producing these highly specialized year books, the specialist-growers' interests would not be served.

R.H.

Land and Labor in Europe, 1900-1950. FOLKE DOVRING. Martinus Nijhoff (Holland). (British Agents: B. T. Batsford). 57*s*.

Europe is a big place, land and labour a large subject and fifty years a long time. The author of this book, formerly an associate professor of agrarian history at Lund University, Sweden, and now an official of F.A.O., is obviously a brave man. But he has tempered his valour with discretion. His book is neither a history nor a detailed economic analysis. It is a survey of contemporary agrarian problems in their historical background, a sort of aerial map to guide the plodding teams of more specialized investigators who alone can occupy the area.

The faults of this book are obvious and irritating. The style is dreary; there is no index; and the necessity of discussing economic problems in national terms entails a breathless series of local studies, so that the reader has constantly to remind himself that what happened in Jutland in 1927 has not necessarily any connection with what happened in Apulia in 1928 or in Bessarabia in 1929. Further, a meagre British source-list, which makes no mention of Garratt, Orwin, Hall or the Astor Report, and the superficiality of his remarks on the British agrarian structure, undermines confidence in his judgment on developments elsewhere.

Nevertheless, the book contains a mass of information not readily available elsewhere, including a number of peculiarly instructive tables. It records the major problems of the agricultural economy of Europe and traces many of them to the failure of the rural exodus to keep pace with technological developments. It discusses systematically and with substantial documentation the major problems of land supply, land tenure, agricultural co-operation and land policy, including detailed discussion of such issues as fragmentation, collective farming, isolated versus grouped farms, and the strengths and weaknesses of the family farm. Above all, it makes clear the dominant part which the State now plays in agrarian development.

It also makes clear the extreme difficulty of formulating good agrarian policies and the extreme ease of formulating bad ones, for agricultural legislation has too often been bedevilled by political and sociological preconceptions, by sentimentality and by ignorance. Indeed, Professor Dovring's book is largely a silent plea for more research and less *Weltanschauung* in agrarian affairs, and the key to his argument comes in the final chapter. In form, this is an analysis of certain authoritative statements on rural policy by leaders of different schools of thought. In fact, it is a kind of intellectual smoke-grinding machine, in which a massive methodology laboriously reduces gaseous ideologies to gaseous particles. The style will distress the sensitive, but the chapter should be read by all in a position to inspire or influence official action affecting the life and work of the countryside.

N.H.

Farm Dogs. (Young Farmers' Club Booklet No. 30). S. M. NATHAN. Evans Bros. 2*s*. 6*d*.

The text of this booklet, which contains 48 pages of clearly printed type, is presented under eight sections: (1) Dogs of the Past; (2) Some Breeds of Today; (3) Buying a Dog; (4) Looking after a Dog; (5) Training and Working; (6) Breeding and Rearing Puppies; (7) Health and Illness; (8) Dogs and the Law.

The publication is well written and reads easily. It is clear that the author has made an earnest study of the subject—although perhaps not always at first-hand—and is obviously anxious to be as helpful and informative as possible in conveying all he thinks could be of use to his readers. In this, maybe, he goes too far;

after all, his readers are young farmers. Is it, for example, necessary to tell them that a litter is a family of puppies, that the term "bitch" refers to the female and "dog" to the male, or that vomiting means being sick? Several such instances of what would seem needless information occur throughout the text. But this may be captious criticism, for in a book of this kind it is probably better to be over-, rather than under-informative.

On page 6, under an excellent picture of a Border Collie, the height is given as 22–24 inches and the weight as 50–60 lb. These figures approximate to the Kennel Clubs' Standard for the Show-Bench Collie, but they are quite "outsize" and so misleading in respect of the working hill dog. Further, the illustration (Fig. 2) on page 5 should not have been included, as the dogs shown there are obviously show-bench specimens—very different in type from working farm Collies. To some readers it may be surprising to learn that the Corgi and the Kerry Blue Terrier are farm dogs; yet Fig. 30 shows a Pembroke Corgi apparently driving quietly and effectively a herd of Friesian cows to pasture.

But the so-called "Shetland Sheep Dog" should surely have been disregarded as a working farm dog. This is an artificial, fancy breed which had its origin round about the year 1900. Because of the breeder's art, it has, for several years past, achieved remarkable uniformity of type, and, today, it is an attractive little creature; but it is essentially a lady's lap-dog —certainly not a working farm dog.

I suggest that in future editions that part of Section 4 which relates to foods and feeding could be improved. It would seem that here too much information has been attempted in too small a space. It is doubtful if the text really helps either the shepherds of the northern mountains or those of the low, southern enclosed pasture lands; one might also query the part which the rabbit (there should be none on the farm!), "game" and "wild" birds play in the farm dog's diet.

Incidentally, Fig. 13 shows a dog kennelled in an outhouse and chained by the neck. If there is some good reason why a dog *must* be chained in an outhouse, then another shack should be built wherein he can be comfortably housed without close restriction of movement. Surely the farm dog deserves his scanty hours of relaxation, unhampered by that rattling, infernal chain.

Although adverse criticisms can be made here and there, the booklet goes a very considerable way in meeting the needs of the young farmer for information and instruction on the important subject of farm dogs. The booklet is generously illustrated, and all of the thirty-four photographic reproductions and the five line drawings are wholly admirable; indeed, several of them are fine works of art.

R.G.

Utilisation of Hazel Coppice. (Forestry Commission Bulletin No. 27). H.M. Stationery Office. 10*s*. (10*s*. 3*d*. by post).

The problem to which the Forestry Commission addresses itself in this new bulletin is of great importance. The total area covered by hazel in this country is some 167,000 acres, and the area required to maintain the hazel wood industry at its present size is only 12,000 acres. The bulk of this area is in the southern counties. The three counties of Hampshire, Sussex and Dorset together contain just over 50 per cent of the total hazel coppice in the country, and the utilization of a greater area than at present depends largely upon the increase in the supply of skilled labour for wattle hurdle making and *in situ* garden screening.

The bulletin contains detailed instructions on the management and utilization of the coppice, its yields, and the hazel underwood industry in general. It also reports the result of experiments to determine new uses for hazel coppice—in particular, the manufacture of hardboard and paper.

The photographs are clear and descriptive, and the appendices give details of particular plantations, the height, weight, moisture content and specific gravity of the produce. A glossary and illustrations of the types of bill hook used complete a very good description of the industry.

It would appear that more consideration should be given to the productive use of the ground, as large areas have been cleared with success for agricultural cropping during the last few years. Even if the industry could be expanded, it would seem that at least 100,000 acres of land should be put to some other purpose. A great deal of this could be planted to other forest crops and some to direct agricultural production, and both conver-

sions have given surprisingly good results in the south of England. From a national point of view, these aspects should be considered by landowners, and in this bulletin they have the basic information relating to the hazel crop set out most clearly.

H.S.D.

Young Farmers in Scotland. NANCY MARTIN. Macmillan. 7*s.* 6*d.*

Young Farmers in Scotland must be the first publication of its kind to deal so authoritatively with the work of the Young Farmers' Clubs movement. It successfully outlines many of the main activities of the organization as well as dealing with its administration.

The young farmer will be interested in the story of a boy who, on returning from National Service, is anxious to take up farming on his own account, and the inclusion of much simple information on farming topics should appeal to young townspeople with an inclination towards a farming career.

That Nancy Martin has lived and worked among young farmers is evident from her description of such events as the Royal Highland Show. The happenings are all seen through the eyes of a typical young farmer visiting the Show. The spirit of the International Beef Cattle Judging Contest, where teams from many overseas countries compete with young Britishers for the award of the "Scotsman" trophy, is also well portrayed. In addition, there are descriptions of many of the best known beauty spots of the north of Scotland, and of such youthful summer delights as *midnight* games of tennis played in "daylight".

M.G.W.

A Guide to the Rent Act, 1957. E. EDEN. Incorporated Society of Auctioneers and Landed Property Agents. 4*s.*

The author, a barrister of the Inner Temple, has arranged this Guide in four parts: decontrol; rent limit for controlled houses; exchange of controlled houses, requisitioned houses and contractual tenancies; and miscellaneous provisions of the Act. A note on the necessary forms prescribed under the Rent Restrictions Regulations is also included.

The Guide does not deal with the provisions of the Act affecting houses in Scotland.

Copies are obtainable from the Incorporated Society of Auctioneers, 34 Queen's Gate, London, S.W.7.

Books Received

Report and Proceedings of the Eleventh Oxford Farming Conference. 6*s.* (Copies obtainable from Mr. M. H. R. Soper, Department of Agriculture, University of Oxford, Parks Road, Oxford.)

Farm Trouble. Lauren Soth. Oxford University Press. 30*s.*

Goat Husbandry. David Mackenzie. Faber. 36*s.*

The Mulching of Vegetables. Patricia Rowe-Dutton. Commonwealth Agricultural Bureaux. 20*s.*

Patterns of Farm Financial Structure. D. C. Horton. Oxford University Press. 36*s.*

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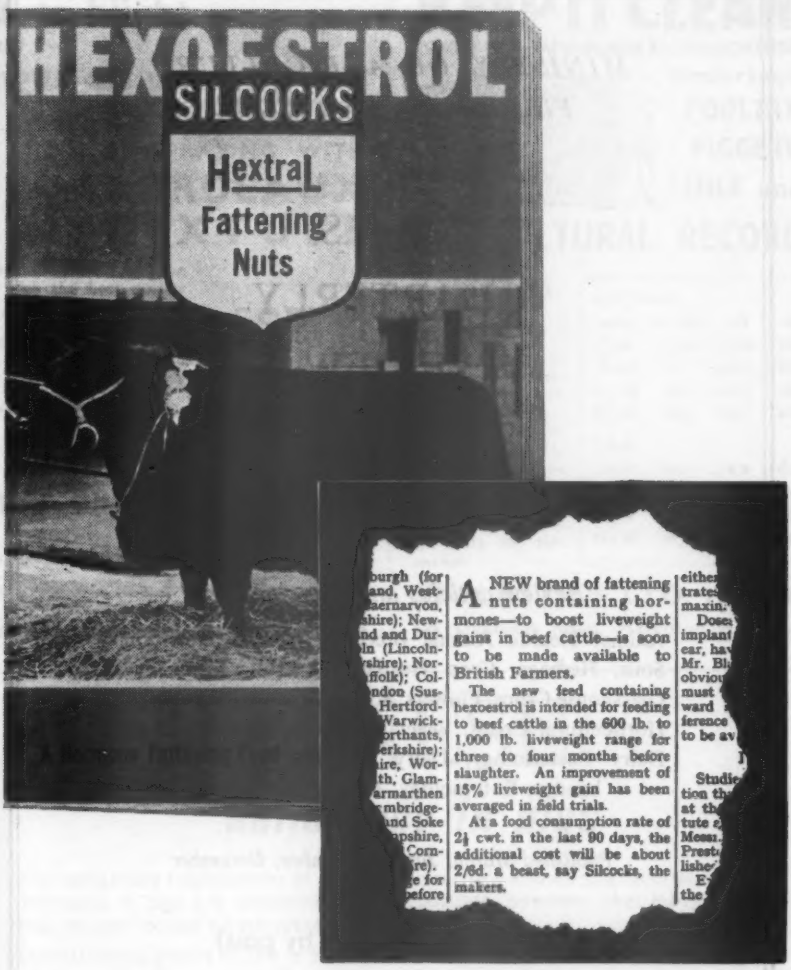
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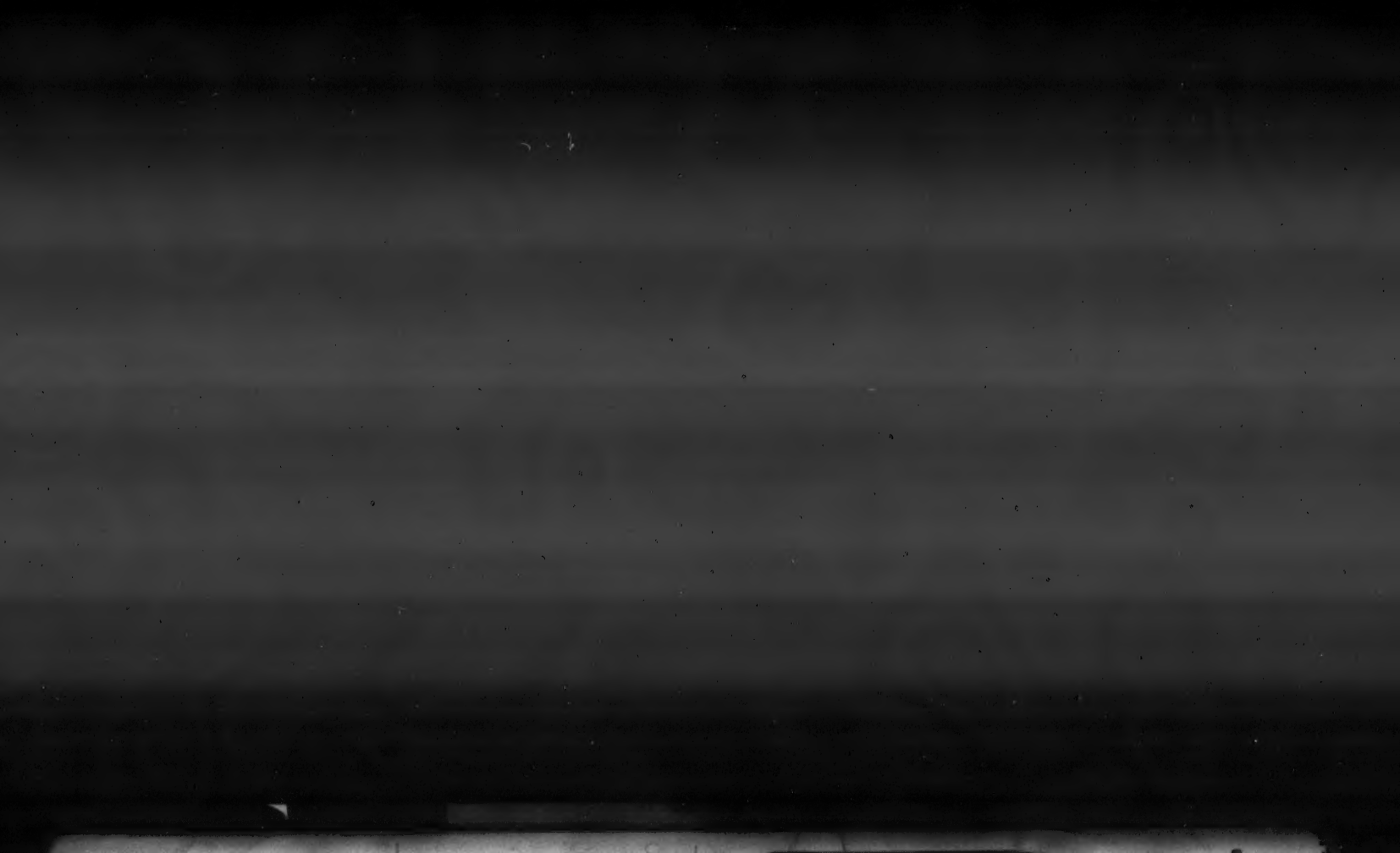
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